

THE IRON AGE

New York, May 26, 1927

ESTABLISHED 1855

VOL. 119, No. 21

Plant Planned for Future Growth

Program Calls for Orderly Expansion According to
Definite Layout Without Preventing Maximum
Use of Existing Factory Space

BY ROGERS A. FISKE*

IF the capital invested in an industrial company increased from an initial \$11,000 in 1891 to over \$3,500,000 in 1927, and if production expanded in like proportion during that time, what manufacturing space will be required in 1945 or in 1963? This is not an unusual question; a similar problem confronts every manufacturer who is building quality into his product and who is alert to expanding his field of activity both in volume of sales and diversity of product.

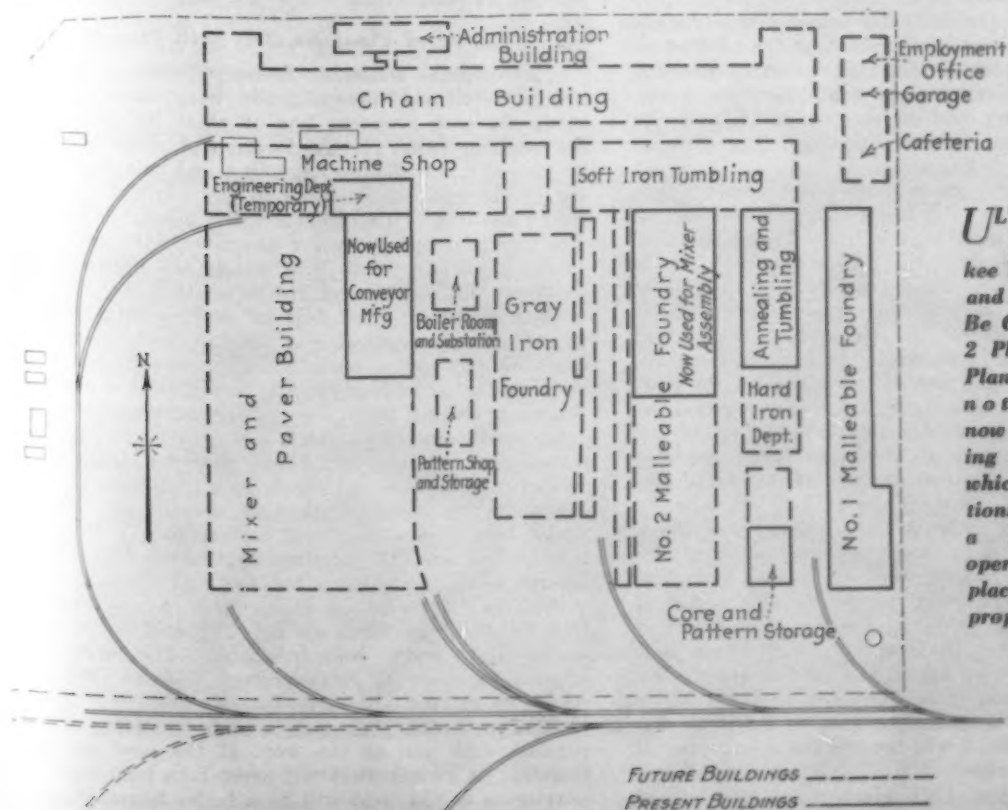
Answers to problems of this kind can be found only through the exercise of intelligent foresight. It is too much to expect that plans, no matter how carefully laid out, will not have to be altered, but over a period of years it has been the experience of numerous manufacturers that production is increased and new lines are added with less inconvenience and fewer delays

when some general scheme of plant expansion has been laid out.

An excellent example of provision for the future is afforded in the plans that were adopted by the Chain Belt Co., Milwaukee, an organization which has not only increased the volume of its sales year after year, but has added new and diversified lines from time to time. With the growth of its business its Milwaukee plant had expanded until finally all available space was under roof. As it seemed improbable that future growth of the business could be provided for in a factory location that was hemmed in on all sides by a rapidly growing city, a new site was purchased. It has been improved with buildings, which, however, are not in every case being used for the purposes that they will serve when the volume of business demands a closer fitting of the complete plan to production.

The Chain Belt Co. was organized by C. W. Levalley

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ULTIMATELY the No. 1 Plant at Milwaukee Will Be Abandoned and Manufacturing Will Be Concentrated at No. 2 Plant, Shown in the Plan View. It will be noted that buildings now completed are being used for purposes which present conditions require, and that a rearrangement of operations will take place when the various proposed plant units are constructed

in 1891 with a capital of \$11,000. Production of detachable chain was started in a room that provided only bench space. A year later larger quarters were rented near the site of the present No. 1, or Milwaukee, plant. In 1902, property for the No. 1 plant was acquired at Eleventh and Park Streets, and shortly after that conveyor and elevator lines were added. Up to 1912 this property had been developed as necessity demanded, and only slight attention had been given to floor space requirements for the future.

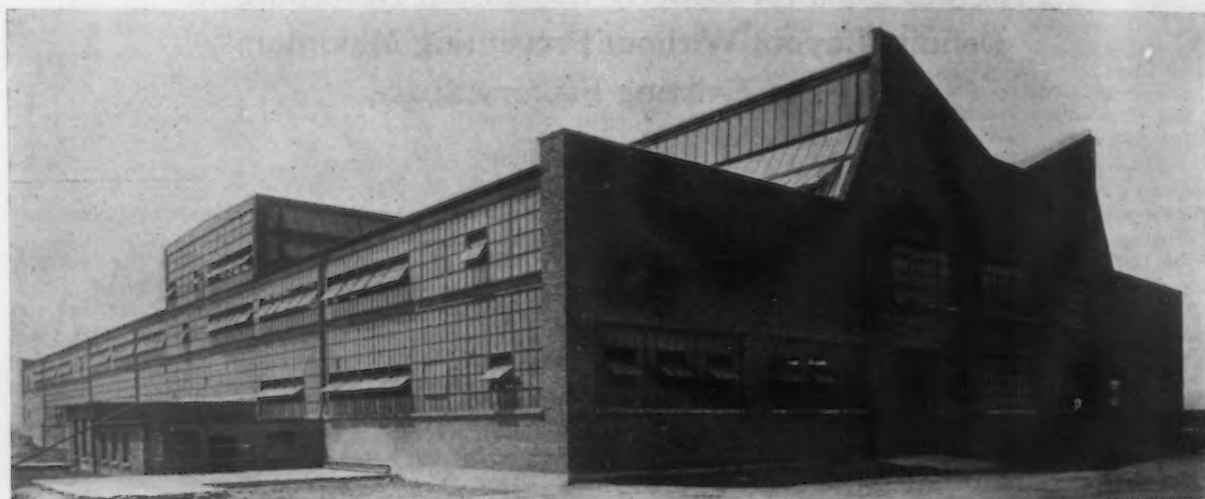
New Site of 59 Acres Acquired

The production of detachable chain called for large numbers of malleable castings, all of which were purchased during the early years of the company. In 1912, however, an opportunity presented itself to acquire a malleable foundry and 11 acres of ground near the outskirts of Milwaukee. Once this property was purchased the possibility of making it the nucleus of a new production center led to the acquisition, first, of an additional 13 acres adjoining the foundry and, later, the

the gray iron foundry, the machine shop and all operations required for the manufacture of chain with the exception of the production of malleable castings. At plant No. 2 stood the malleable foundry, the annealing and tumbling building; the first section of the second malleable foundry, now being occupied by the concrete mixer assembly; the first section of the mixer and paver building, now being used for the production of conveying machinery; a pattern shop and core room; and a temporary boiler house.

Fixed Charges Low on Gray Iron Foundry

The gray iron foundry was placed on a production basis at plant No. 1 in 1906. It is housed in an old building, the capital investment in which has been practically written off the books through the operation of a replacement fund. With overhead thus reduced and present capacity ample for all requirements, this company is setting aside pride and, at a saving in production cost, will continue to use the old gray iron department until the urge for increased tonnage makes neces-



The First Section of the No. 2 Malleable Foundry Building. It is used at present for concrete mixer assembly, which later will be moved to the mixer and paver building

purchase of a 35-acre tract, bringing the total holdings at the site to 59 acres.

The purchase of the malleable foundry immediately brought up the question of coordinating the production of the old and new plants. The plan drawn up provided for the use of all available space at plant No. 1 and the malleable foundry, and the erection at the new site of such buildings, or parts of buildings, from time to time as production demanded.

A location for a second malleable iron foundry unit was selected at the new, or No. 2, plant, and a portion of the building was erected, which at the present time is used for the assembly of concrete mixers. This is a line, added in 1908, that had expanded so rapidly that by 1920 it was necessary to move the assembly operations to a larger space. The structure now occupied will be vacated when increases in the demand for chain castings necessitate the use of the space for its original purpose. When this occurs the mixer erection department will be permanently housed in the mixer and paver building, a portion of which has been completed and is now used for the manufacture of conveying machinery.

The first product made by the company was chain, as previously mentioned; elevating and conveying machinery were added in 1900; concrete mixers were first built in 1908; traveling water screens became a part of the line in 1912. In 1926 the Stearns Conveyor Co., Cleveland, came under the control of the Chain Belt Co. by the purchase of all of the capital stock. No transfer of production from Cleveland to plant No. 2 is contemplated, but ultimately plant No. 1 will be dismantled and plant No. 2 will become the sole center of production in Milwaukee.

At the beginning of 1927, plant No. 1 still housed

sary the erection of a new gray iron foundry on a site selected at plant No. 2.

Layout of Plant No. 2 Is Well Planned

The original malleable foundry building, to which several additions have already been made, extends along the east property line of plant No. 2 and was the starting point for the location of other buildings. To the west stands the annealing and tumbling building, which can be extended to the south. The completed one-half of the proposed new malleable building, now occupied by the mixer assembly, is located west of the annealing room. Ultimately the hard iron department will be located at the south end of the annealing building. The flow of product will be from about halfway lengthwise of the two malleable foundry buildings to the hard iron department, then north through the annealing section to a proposed soft iron tumbling, sorting and inspection department, which will extend east and west to form a close working unit with a new machine shop and a new chain building.

Between the two malleable iron units and south of the annealing building stands a three-story structure which serves as a core and pattern shop. It can be doubled in size by building to the north. Sand is hoisted to the roof of this building and spouted to containers on the third floor, where the cores are made and then baked in gas-fired ovens. The core room is unusually light and is well ventilated. The second floor is used as a metal pattern shop, and the first floor serves as pattern and core storage space.

The projected gray iron foundry building will be parallel with and to the west of the new malleable foundry. A switch track will serve both buildings. The next units to the west will be a boiler house, which in



Parts for Conveyors Are Now Fabricated in the Mixer and Paver Building. Later shapes and plates will be fabricated here for both conveyors and concrete machinery

the completed plant will occupy a central location with respect to all buildings, and a pattern shop and storage building.

Mixer and Paver Building Will Adjoin Machine Shop

The mixer and paver building, of which less than one-sixth has been erected, is at the extreme west end of the group. The new machine shop will extend east and west along the north end of the mixer and paver building. The chain building will be built near and parallel to the north property line. A rough casting receiving and storage room will be constructed at the east end of the machine shop and in the line of flow of castings from the foundry units. As machine operations are completed, parts will be directed either to the mixer and paver building or to the chain building, as required.

At the present time the bulk of machine work on mixer parts is performed at plant No. 1, and those parts are then sent to plant No. 2, where they are assembled in the building which will ultimately house the No. 2 malleable foundry. With the erection of the new machine shop, the mixer department will properly fit in with the conveyor department, for the reason that it will be in its appropriate place in the scheme of flow

of materials and because mixers and conveyors alike require a considerable amount of structural fabrication, which can be provided for in one department.

Present Arrangements for Assembling Mixers

The building as now used for mixer erection is divided into three north and south bays. A material-receiving track extends into the south end of the west bay, and a temporary shipping track enters the south end of the middle bay. Structural material is stacked in the southwest corner and, as used, travels north, first from stock to the layout department, then to the shears and the fabricating shop. This west bay is served by a series of jib cranes, each being of 1500 lb. capacity. Heavy mixer parts are stored at the north end of this bay.

The north end of the center bay is occupied by a store room. Structural parts to be assembled are moved from the west bay to the center bay, a section of which is used as an assembly and riveting shop. Parts for large concrete mixers move south for final assembly in the center bay, which is served by a 25-ton crane. The north end of the east bay is reserved for unit assembly. Small-sized mixers are built in this bay, the final assembly being provided for at the south



Conveyors are assembled in the High Bay of the Mixer and Paver Building

end, where complete gasoline engine units are stored. A 5-ton crane is provided in the east bay. The design of the building is such that it can be readily converted to the production of malleable iron castings, as planned.

Engineering Department Is in Temporary Location

The mixer and paver building, now occupied by the conveyor department, will ultimately be 300 ft. wide x 600 ft. long, and will terminate at the north end at the new machine shop. The bays extend north and south and are so designed that the outside bays will be high and the four intermediate bays will have comparatively low roofs. In utilizing the building for its present purposes, it was decided to provide space close at hand for the engineering department. Accordingly, one section of the proposed machine shop was erected and fitted as office space. With the expansion of the plant as now planned, the space occupied by the engineering department will become a part of the projected machine shop, and the engineers and draftsmen will be moved to the second floor of an administration building, which will be erected at a later date. The present engineering building is so designed that alterations, other than removing the temporary walls, will be unnecessary in making it a part of the machine shop.

The Conveyor Department as Now Organized

The existing conveyor department consists of one high bay on the east side and two low bays, all of which are headed at the north end by a cross bay, which is used for a steel store room. The concrete

floor in the shop does not extend into the steel store room, steel being piled in racks that stand on a dirt floor. This arrangement acts as a deadener of shop noises, which would otherwise be transmitted to the engineering offices. A receiving and shipping track extends the full length of the high bay into the steel store room. Steel is cut to length in the store room and then moves to the west bay, where it is laid out and the lighter operations in the course of fabrication are performed. The parts are then moved to the center bay where they are formed preparatory to delivery to the east bay for final assembly. The office and tool room are located at the north end of the center bay and small parts are stored in the north end of the east or high bay. The two low bays are each served by a 2-ton floor-operated traveling crane. The west crane runway extends over the steel store room floor, and a 10-ton overhead crane is mounted in the east or high bay. Jib cranes are mounted at strategic points in the west and middle bays, and a 2-ton traveling jib crane is mounted on the east line of columns in the high bay. All crane equipment was furnished by the Harnischfeger Corporation, Milwaukee.

With completion of all the buildings now planned for the No. 2 plant, there will still remain available for future expansion about one-third of the 59 acres that have been taking the overflow from plant No. 1.

The plans for expansion, as well as the design of all of the new buildings, were developed by Frank D. Chase, Inc., engineers and architects, Chicago, in cooperation with the management of the Chain Belt Co.



The Low Structure in the Foreground Will Become a Part of the New Machine Shop. It now houses the engineering department. In the rear is the completed section of the mixer and paver building

DEFECTS OF METALS

Loss of Strength and Remedy Suggested for Intercrystalline Embrittlement

As the result of an investigation, covering several years, to discover the causes of, and if possible, remedies for that puzzling defect of metals known as "intercrystalline brittleness," the United States Bureau of Standards has found that the only certain protection is to reduce the stress in the metal to a point below its yield point and to eliminate corrosion on the surface.

One of the most characteristic properties of metals, especially of the common and more familiar ones, is that of ductility. The gradual change of a metal while in service from a condition of relatively high strength and high ductility to one of low strength and high brittleness, the substance retaining in many other essential respects, however, the appearance of the metal in its initial state, is very disconcerting and often a grave source of danger. Such a change is generally known as "intercrystalline brittleness" since it can be shown that the change consists essentially in a weakening of the "bond" between the constituent grains of the metal, the individual grains themselves being very little affected, if at all. Such a change not infrequently results from a corrosive attack.

Intercrystalline brittleness resulting from simple corrosion can usually be associated with the existence of certain contaminating substances in the metal which may, however, be present only to the extent of a few hundredths of a per cent. In a few cases, however, pronounced intercrystalline embrittlement can be brought about by certain corrosive reagents even on metals of very high purity, as is the case with lead.

The embrittlement of certain aluminum alloys of the duralumin type, in sheet form, and the warping and swelling of die castings may also be cited.

A metal, subjected simultaneously to a corrosive attack and to a tensile stress until failure occurs, not infrequently shows the characteristic appearance connoted by the term "brittle." This is true for such soft metals as tin and lead as well as the strong metals, nickel and iron. It can usually be shown that the individual grains of the metal have not been rendered brittle by the combination of stress and corrosion but that the attack has been confined largely to the intercrystalline "bond" so that the grains are simply pulled apart without exhibiting any ductility. The tensile stress in any case must be near the yield point of the metal.

Intercrystalline corrosion at elevated temperatures may result in embrittlement in certain cases, such as the attack of nickel by sulphurous gases. The "season cracking" of wrought brass and other copper alloys is one of the most important cases of intercrystalline corrosion from an industrial standpoint. With the ferrous metals, the "caustic embrittlement" of low carbon steel in the form of boiler plate is of the greatest industrial importance. Such material, when stressed sufficiently, usually as a result of high internal stresses from severe fabricating operations, together with the stresses set up in service and subjected to a corrosive solution such as sodium hydroxide fails similar to other metals subjected to stress corrosion.

The practical remedy for the problem is obviously along one of two lines according to the bureau: (a) either to reduce the stress, (internal stress plus external load), acting upon the metal very materially below the yield point of the metal in question, or (b) to eliminate the corrosive attacks on the surface of the metal.

Urge Enlightened Selling Policy

Institute Speakers Cite Improvement in Morale in
Quarter Century as Best Promise for Future—
Competition No Bar to Cooperation

"I DO not think everyone fully comprehends the very great difference between honest, fair and decent competition and ruthless, destructive competition. There can be perfect competition and, at the same time, perfect cooperation." In these words Judge Elbert H. Gary, president of the American Iron and Steel Institute, emphasized the main theme of his address before the opening session of the thirty-first general meeting of that body. The institute convened in the ball room of Hotel Commodore, New York, May 20, and the audience that assembled to hear the president's remarks was unusually large.

The need for a greater spirit of cooperation was also stressed by Eugene G. Grace, president Bethlehem Steel Corporation, who was a speaker at the banquet in the evening. Notwithstanding heavy investments in plant and equipment, he said, the steel industry is making the same profit per ton within a few cents as 13 years ago. In his opinion, it is only necessary for the steel manufacturers to reach a sound understanding among themselves to put the industry on a satisfactory basis.

The improvement in the selling methods of the industry in the past was cited as an earnest for still further betterment in the future. Curiously the most optimistic expressions regarding the future came from two of the oldest men in the institute, Judge Gary and Willis L. King, vice-president Jones & Laughlin Steel Corporation, who was also a banquet speaker. "When I think of what the iron and steel business was doing, the methods practised 24 years ago, and compare that to the present time," said President Gary, "I know that the iron and steel business is on a very much higher plane at the present time."

A rosy picture of the future was also painted by Darwin P. Kingsley, president of the New York Life Insurance Co., New York, who was the principal speaker at the banquet. Unless we become dull witted, he asserted, we shall achieve an economic order as far removed from the present as the stars are distant from the earth.

The immediate business outlook was described as encouraging, in a prepared statement read by President Gary, published elsewhere. Included in this report were statistics of bookings and shipments by the Steel Corporation. New bookings from Jan. 1 to date were disclosed as being larger than for the same period last year, averaging 41,941 tons per day as against 38,700 tons in 1926.

Judge Gary's remaining remarks were extemporaneous and are quoted, in part, as follows:

Praises Coolidge Administration

"Opportunities for progress and prosperity in this country are better than they ever were before. Every man who reads, listens, thinks and understands, must agree to that proposition.

"Since I have known anything about the iron and steel business there has never before been a time when the governmental administration was honestly, sincerely and actively so much interested as at present in the prosperity of the people of this country, and the whole people.

Counsels Fairness to Competitors

"We have in the iron and steel industry, I think I am justified in saying, as big men, as honest and as fairminded men, men who come nearer to being per-

Steel Industry in Strong and Hopeful Condition—Gary

FOR nearly three years we have enjoyed a continuous period of considerable activity and moderate profits in the iron and steel industry. Within that time there has been no marked "boom" as formerly that term was generally understood, but we have been favored with a steady and reasonably full volume of business. It is unnecessary to analyze here the specific and well understood reasons which have brought about this condition of stability. So far as we can see, there have been no changes in fundamentals, nor indications of changes, which may operate to seriously interfere with the even flow of business which has been so marked a feature of recent years.

There has been keen competition, which we must expect and should welcome, if sane and reasonable, which frequently is not the case. Competition within its proper limitations is good for everyone. It is an incentive to produce better commodities, to give better service and to economize in cost of production. It furnishes added zeal to the enterprise and operates to the benefit of producer as well as consumer.

Of course, occasionally there will be

a recession in certain lines, sometimes of considerable degree. This is only natural and healthy. It is undesirable to drive the business machine continuously at its maximum speed. Nevertheless the business of this country is merely an evidence of the activities, aims, ambitions and energy of nearly one hundred and twenty millions of people—an irresistible force which will surmount and overcome adverse factors as they arise from time to time as a result of nature's forces or otherwise; although such factors may here and there for brief periods tend to slow down industrial and commercial activity.

It is believed there has been but little, if any, speculative buying of steel products, for there are no banked up inventories of unusual size. Consumption proceeds daily and hourly; the energies of our people necessitate the use of our products; any drop below the average in these demands will be only temporary.

The iron and steel industry, on the whole, is in a strong and hopeful condition. This is more or less indicated by current reports of one of the leading steel manufacturers, which prob-

ably is representative of the average for the whole industry, namely:

	This Year (Tons per Day)	Last Year (Tons per Day)
New bookings in current month, to date	30,133	30,300
New bookings for same period in previous month..	38,352	29,600
New bookings from Jan. 1 to date...	41,941	38,700
Shipments in current month to date	47,768	45,200
Shipments for same period in previous month	48,677	47,900
Shipments from Jan. 1 to date...	47,634	49,500

These figures show a very sound and encouraging situation.

Our country is rich in resources awaiting development and expansion; our national income is large and funds are plentiful and cheap; men's ambitions and incentive are very deserving. Supported by well warranted confidence, the effort and energy of the American people, which apparently cannot be materially restrained, will push forward on constructive lines. All this means a continuous good volume of business and, in general, satisfactory profit returns.

fect gentlemen, as can be found in any line of any business anywhere in the world; men who can be appealed to, to do the right thing and the fair thing. But we are just as greedy, just as selfish as nature has made us, and we cannot throw stones at one another. But I do think that sometimes competition, which I have said is a great thing for all the people, has been carried too far, and from motives of selfishness we sometimes secure business for ourselves that really, justly and naturally belongs to some of our competitors.

"I think we fail to realize that in the long run, year by year, month by month, we will get more business, and certainly will get fairer prices, if we act more unselfishly, if all the time we consider the rights and interests of our neighbors.

Morale of Industry Has Improved

"When I think of what the iron and steel business was doing, the methods practiced 24 years ago, and compare that to the present time, I know that the iron and steel business is on a very much higher plane at the present time; and if one not engaged in the iron and steel business should tell me that an iron and steel man or a substantial number of them were tricksters, I would resent it and would defend the person or persons because I know what the morale of the iron and steel business at the present time is as compared with old times. I know how much happier we are and how much more prosperous we are because of the moral position which we occupy at the present time.

Urges Enlightened Competition

"Now I am not against competition. I believe in it thoroughly and believe it is a great thing, a good thing and a wise thing. I believe in the Sherman law. However, I do not think everyone fully comprehends the very great difference between honest, fair and decent competition and ruthless, destructive competition. There can be perfect competition and, at the same time, perfect cooperation. Now there is no contradiction, practically, in those words, competition and cooperation. When we help others we help ourselves; and the ordinary customer, although we do not appreciate it, when he finds us doing tricky things in his favor, has less respect for us than he would have if we tell him, 'We practice what we preach; we are sorry, but we cannot do it.'

"I tell you, as I believe firmly in my soul, that the man engaged in the steel business at least will do more

for himself, make more money for himself, if all the time, in every transaction, he is considering the rights and interests of his neighbor.

"There may be some in this room who say, 'Gary is preaching a beautiful theory.' But you will find if you look at your books year after year that you have made money by being decent, always.

"And remember, while talking to you gentlemen on the floor, I am talking to that fair-minded, decent, honest man, who sits right there, who has general oversight of the selling policies of the Steel Corporation; remember that I am talking to him and that I am talking to him here in your presence, not differently from my conversation in my office. But if anyone says he is the only one I am talking to, he is very much mistaken. (Laughter and applause.)

"It is a fact that this competition in business such as ours is carried too far; also it is a fact that our bringing up was a little wrong. You older men carry your mind back 30 years when you got up at 3 o'clock in the morning in order to get some order a little later in the day that you knew you were not entitled to; you justified yourselves by the fact that, while you were a little mean, your competitor was a little worse. That is not a justification.

Beginners Should Start Business Right

"Here is another thing I would like to say to some—I will not call them recalcitrants, I will call them new beginners who are just starting out in business, who consume themselves with the idea that they must do something to get business when they are starting that may seem a little wrong because it is hard to start. I want to say about that, upon that subject, the way to get started, to get going as we call it, is to act right, to act in such a way that your own customers will say to you, 'I like to do business with you because I know from your conversation that you are fair with your competitors and, if you are fair with your competitors, you are certainly fair with your customers.'

"The steel people generally have established for themselves a reputation that is world-wide for being decent, square, honest, dependable, and occupying a higher position morally than they used to occupy years ago.

"Gentlemen, you have established for yourselves generally a reputation that you not only ought to be proud of but that you must be careful to live up to if you are going to maintain that reputation."

Steel Industry Must Have More Than an Investment Return

A YEAR ago in addressing the institute President Grace of the Bethlehem Steel Corporation urged the steel mills to become better merchants. In speaking at the banquet last Friday night he stated that so far as he could see there had been little improvement in merchandising ability. "I think we can claim for ourselves without egotism that we are wonderful manufacturers." A high degree of efficiency has been obtained; costs have been reduced to a low point; no group of employees is better compensated or as well compensated as in the steel industry, and the customers of the industry are well treated. He added, however, "We have failed to give the people who have placed us as trustees in charge of their business a fair and adequate return."

In the period since the beginning of the war, a period of nearly 13 years, the annual compensation to employees has increased 108 per cent, hourly wages have increased over 200 per cent, the cost of living has increased 75 per cent, and there has been an increase in the prices of commodities generally of 51 per cent. Prices of steel, however, have gone up only 35 per cent, and the large tonnage products—plates, shapes and bars—have advanced a bare 28 per cent.

The steel industry in the last 13 years has invested \$1,650,000,000 for new plants, extensions, rehabilitation, etc. Yet it is making the same profit per ton within a few cents as at the beginning of the period, Mr. Grace stated. The leader of the industry, the United States Steel Corporation, had \$2,185,000,000 employed in its

business in 1926 and made profits of only 6.54 per cent. The General Motors Corporation, a leader in an industry supplied by the steel mills, had \$638,000,000 employed in its business in 1926 and made \$186,000,000, or 29.20 per cent. One can't expect the steel industry to exist on a mere investment return, said Mr. Grace in commenting on this unfavorable comparison.

Past Teaches Importance of Concord Among Mills

Vice-president Willis L. King of the Jones & Laughlin Steel Corporation saw hope for the future in the progress that the steel industry has made since he was a young man. At that time, he said, there were some 40 iron mills in Pittsburgh. Money was scarce for carrying on business and making needed improvements. There was no concord among the manufacturers of that day, who believed in running their businesses solely for themselves. As a result, most of the time they sold their products at, or below, cost. Not more than five or six of the 40 survived.

The steel industry of today, he asserted in concluding his remarks, is in the hands of a lot of capable young men and is only beginning to achieve its great end.

United States Leads in Per Capita Production

In speaking on the subject of "Power and Per Capita Production," Darwin P. Kingsley, president New York Life Insurance Co., New York, stated that our output

per capita, including men, women and children, is 150 per cent of that of our nearest competitor, the Canadian, and 3000 per cent of the production of the Chinese. The United States, he said, uses more power, other than human, than any other people. We have discovered that the more power we use, other than human power, the more wages we can pay and the more labor will produce.

People from foreign lands are impressed with three things in this country: our railroads, our manufacturing and industrial plants and our architecture. American architecture stands out because it is closely related to the welfare and well being of our people. It differs from all previous types, added Mr. Kingsley, because we solved a problem that had baffled all previous builders—we reduced weight and mass and increased strength by the use of steel.

The world was never so interesting, never so much alive, never so alluring as it is to the youth of today,

declared Mr. Kingsley. It is a larger world than the world of yesterday and it is larger chiefly because it calls for larger men. The individual must become more and more efficient. Every man must do four and five times as much in production as 25 or 30 years ago. Men must think faster and decide more quickly. The time calls for men of instant decision, sound mind and sound judgment.

Attendance of 1545 at Banquet

The remaining speaker at the banquet was Hugh Morrow, president Sloss-Sheffield Steel & Iron Co., Birmingham, whose humorous remarks brought out rounds and rounds of laughter and applause. The attendance at the banquet was 1545.

During the morning and afternoon technical papers and discussions were presented, abstracts of which follow.

Application of Welding to a Steel Structure

BY J. H. EDWARDS

AN all-welded five-story shop building was recently erected at Sharon, Pa., for the Westinghouse Electric & Mfg. Co. This is probably the outstanding example up to the present time of welded building construction. The author's paper gave details of its design, fabrication, erection and cost. He arrived at the following conclusions:

By comparing the actual costs of this welded structure with what a riveted one might be expected to cost, we find that there was a saving in material, due to design, of about 95 tons, or 11 per cent; the template making was a trifle less for welded; the shearing, marking, punching and finishing would be about 10 per cent less for welded, the assembling of parts for welding about 100 per cent more for welded, and the welding in the shop, not including the use of electrical equipment, shows a cost four times that of shop riveting. The raising of steel in the field, due to extra guying for alinement, was increased about 10 per cent, and the field welding cost, not including the installation and use of electrical equipment, current and training of welders, was about the same as the riveting would cost. Prevailing shop and field labor rates were paid. Standard overhead expenses are included in the costs. After deducting the cost of training welders and making due allowance for other items that were included in this first job, and would disappear if shop were organized for welding, the additional cost of welded structure would be about \$10 per ton, or about \$8,000. The material saved by welded design was 95 tons at a cost of about \$3,800, showing an excess cost of \$4,200 over a riveted structure, not including use and maintenance of electrical equipment, welding wire and cost of training school, all furnished by the Westinghouse company.

Estimates, based on unit costs determined on this work, indicate that the continuity feature of the design as a whole cost more than the material saved, besides introducing into the design and fabrication some complicated and possibly undesirable features. Continuous or fixed end support members have their place in structures, but before being used to any great extent all engineering and cost features should be carefully weighed.

Based on the experience gained from this work it would seem that the all-welded skeleton structure is not the most economic one. It is possible that some parts of such a structure might be welded to advantage.

By the fusion welding process joints can be made as strong as the base metal, and the full gross section of a tension member can be used, with no deduction for holes as when rivets are used. Due to the greater stiffness of end connections, and the ease with which component parts can be more rigidly held together, welded details of compression members increase their efficiency. By taking advantage of these favorable factors, and with the added advantage that will obtain when sections more suited to welding are rolled, there may be some saving in material that will more than offset the extra cost of welding.

Where existing structures require strengthening because of increased loading, material can be added more advantageously by welding than by the expensive method of drilling holes and driving rivets in awkward field positions; also when additions are made to structures, welded connections can be well and cheaply made with a minimum disturbance of walls and exposure of occupants. Furthermore, in favor of welding there are other considerations that might be given some weight

MR. EDWARDS occupies the position of assistant chief engineer of the American Bridge Co., New York. Born in Oxford, N. Y., in 1864, he was graduated from Cornell University in 1888, in civil engineering. He became affiliated with the engineering department of the Berlin Iron Bridge Co., West Berlin, Conn., for several years as chief engineer. When this company was absorbed by the American Bridge Co. in 1900, he became a member of the American Bridge engineering staff.



aside from economy, such as the elimination of noise of riveting in thickly settled communities; another somewhat connected factor is the possibility of making welded connections, for resisting lateral forces such as wind, much simpler than the present cumbersome riveted brackets that interfere with the architectural treatment of exterior walls and interior finish. Welding can be used to supplement riveting and will eventually find its economical place.

Designers and fabricators of structural steel from many years of experience have learned the virtues and weaknesses of rivets and know how to use them to make safe and economical structures. They are now seeking the fundamental facts concerning the welding art on which they can base their determination of strength. It is generally accepted by those who have had any structural steel welding experience that safe and reliable welds can be made by a trained operator following a well defined procedure control. There is a demand for standard specifications and methods of making welds by the different processes. Values on some unit bases for the strength of welds of different types should be fixed. Some reliable way of controlling the mechanical and personal element used in making welds, and in testing the completed work, should be established. With these factors fixed by scientific research and made available to the industry, the manufacturers of welding apparatus, the advocates of welding as a method of joining steel parts, and the fabricators of structural steel, all co-operating to solve an engineering and economic problem, will doubtless make great progress in the develop-

ment of the art of welding in the structural steel industry.

Discussion

F. M. Farmer, of the Electrical Testing Laboratories, New York, and president American Welding Society, in commenting upon Mr. Edwards' paper on "Welding of Steel Structures," said that there are two particular features which must be considered in connection with the question of riveting vs. welding. The first is design, the second is supervision.

Present structures have been worked out from commercial shapes of beams and angles which, through a long progress of years, have been developed for riveted connections. It is possible that the fullest advantage of welding, as applied to steel structures, may be had only when shapes specially designed for welding become available. Perhaps the years of experience which we have had in riveting may have to be duplicated in welding before the greatest benefits and assurance are ours.

As to supervision, it may be said that welding work, when properly done, provides a unit breaking stress as high as that of the metal joined by the welds. The question remains: How do we know it is properly done? This is a very large question. However, where welding is done in the shop by automatic machines with automatic control of the quality, we do know. In the field a proficient welder can be relied upon, if only it is seen to that he remains proficient. Only by furnishing him with proper materials, however, can this proficiency be assured.

The Theory of the Blast Furnace

BY RICHARD FRANCHOT

FROM a strictly metallurgical standpoint, blast furnace operation has not changed materially since the introduction of the hot blast nearly a hundred years ago. While the mechanical engineer has accomplished in two generations a ten-fold increase in productivity per unit of furnace volume, the metallurgist is now getting just about the same results as to efficiency that Sir Lowthian Bell showed some 50 years ago. Despite the promise and implication of the dry blast, the furnace is today more a gas producer than an iron smelter, that is to say, the energy absorbed in converting ore and stone into metal and slag is at best less than the latent energy of the top gas.

Assuredly, the steel plant has been forced to use blast furnace gas, in spite of its inefficiency as a fuel, because no method has been known by which the furnace could be prevented from producing a surplus of gas over its own needs. The static state of iron metallurgy over several generations seems quite definitely related to a lack of theoretical explanation for the furnace action. Exact knowledge has been lacking as to

why the ore burden is, under present conditions, necessarily limited to that which uses from 30 to 40 per cent of the coke and air energy and why, consequently, the furnace is forced to reject in its top gas from 40 to 50 per cent of its energy input.

The explanation seems simple enough: While the air oxygen, assisted by the blast heat, is developing heat available for high temperature work, the air nitrogen, in actively forming nitrides and carbonitrides, notably cyanides, is absorbing a good part of this available heat. Nitridation thus offsets oxidation. By the use of high blast heats something like 15 per cent of the total oxidation energy of the coke is made available at the hearth temperature (1500 deg. C.).

Variations of gas composition in the lower part of the furnace, supported by observations of cyanide concentration, indicate that often 4 per cent or more of the air nitrogen is fixed as cyanide vapor, hence that upward of 30 per cent of the available oxidation heat is absorbed in nitridation, leaving not more than 10 per cent of the total coke energy actually available



MR. FRANCHOT was graduated from Cornell University in 1896. He was born at St. Albans, W. Va. From 1908 to 1918, when he became a captain in the chemical warfare service, he was in the chemical manufacturing business at Niagara Falls, N. Y. In 1919 he joined K. P. McElroy, chemist and patent attorney in Washington. For the past three years Mr. Franchot has specialized in the blast furnace, latterly in nitrogen fixation in that connection. He is vice-president of Ferro Chemicals, Inc., Washington.

for the work devolving upon the hearth. Thus the necessity of burning with air a large amount of coke relative to the iron in order to maintain the hearth temperature becomes intelligible.

The hypothesis that nitrogen fixation limits the availability of the heat and hence limits the burden seems to possess four elements of validity:

- 1.—It has a sound basis in fact.
- 2.—No incompatible fact has been established.
- 3.—Low smelting efficiency is systematically explained by the hypothesis.
- 4.—No other valid explanation of the furnace action appears to be available.

The blast furnace has been often characterized as a gas producer. It now appears that other functions underlie that of gas producing: The furnace appears to be a still, a reflux condenser, a nitrogen fixer. Small wonder perhaps that as an iron smelter it is "not so good."

Discussion

Sharp dissent from some of Mr. Franchot's conclusions was expressed in a written discussion prepared by S. P. Kinney and T. L. Joseph of the United States Bureau of Mines, which was read by Dr. C. H. Herty, Jr. This paper referred to tests made in a Southern blast furnace, in which samples were taken off during the regular commercial working of the furnace, at three levels, in a study of the concentration of potassium cyanide in the gases. The lower level was at the tuyeres; the second level was 27 in. above the tuyeres, and the upper level 19 ft. 3 in. above them.

At the upper level there was a slightly higher concentration of cyanide than at either of the lower levels, and it was much more uniform across the diameter of the furnace, being in fact almost a straight line. The average amount of cyanide per thousand cubic feet of gas at this level was found to be 3.47 oz., or about 0.22 lb. This figure may be compared with the 9 lb. reported by Mr. Franchot.

On the basis of the bureau's experiments and findings, the fixation of nitrogen in the furnace would be about 0.06 per cent, in place of the 4 per cent reported by Mr. Franchot. In producing this result, the bureau's estimates are that only 0.03 per cent of the heat in the hearth would be thus absorbed.

Disposition of Missing Calories

Where the missing heat units, reported by Mr. Franchot at 207 calories per lb. of pig iron, go was believed by Mr. Kinney and Mr. Joseph to be quite different from the disposition reported in the paper presented. Instead of being used in fixation of nitrogen, they reported nearly 80 per cent of the unaccounted for calories as having been required in the heating process itself. For instance, to get solid matter, such as ore, limestone and the coke charge, up to a temperature of 1500 deg. C., the heating element must supply a considerably higher temperature. Otherwise the condition would be static and no iron would be produced. If we assume that the gas from the heating fuel is at 1600 deg., this difference of 100 deg. at once accounts for 162 calories of the missing 207 calories.

Operation of Large Hearth Furnaces

BY JAMES E. LOSE

THE increase in blast furnace output during the past few years has been of such magnitude that it may be considered the most outstanding feature of their recent development. Analysis of the cause of the increased output shows it to be the result of several factors. One of the most prominent has been the general installation of large hearth furnaces, which have proved beyond doubt their ability to make more iron of equal or better quality, with no more and usually with less coke per ton of iron than is possible with smaller hearth furnaces.

Another factor of equal effect upon the tonnage increase has been the tendency to drive the furnace to the upper limit of wind capacity, consistent with, and in some cases in spite of, the economic relation between increased furnace loss and decreased cost above. Several reasons are to be found for this development. One is the new installation of single furnace plants built during periods of excessively high construction costs. Such furnaces are usually operated on picked raw materials and are pushed to the upper limits of

capacity in order to reduce the per ton cost of interest on the extremely heavy investments they represent.

The high tonnages produced by these plants became an incentive for other furnace operators to reach higher outputs and resulted in a spirited competition between plants. Also, as the large hearth furnaces were built in increasing numbers at different plants, it was found that what was formerly considered the upper limit of wind capacity no longer held true and that a considerable increase could be made in the wind blown, and consequently higher production realized with little detriment to other features of operation.

These conditions have resulted in a nearer approach to maximum possible production than ever before realized. A clear example of this is seen in Table A, a comparison of a year's operation of two furnaces of equal size, furnaces No. 6 and E, located at the South Chicago plant of the Illinois Steel Co. The performances given are for the year 1919 for No. 6 Furnace, and for the year 1926 for E furnace.

The comparison shows E furnace to have produced

MR. LOSE was educated at the Carnegie Institute of Technology and entered the employ of the Carnegie Steel Co. in 1910 as a tracer in the drawing room at the plant of the Carrie furnaces. He has been continuously employed at the plant since then, as draftsman, stock house foreman, superintendent of construction and assistant superintendent of furnaces. In September, 1924, he was appointed superintendent of the Carrie furnaces, which position he now occupies.



121.6 tons more iron per day, and that it was blown with 15.9 per cent more wind per minute. This comparison is an indication of the results being obtained in the very recent campaign for higher tonnages, and shows that the full possibilities of the large hearth furnaces were not realized for some years after they were developed.

Table A.—Comparison of Two Furnaces of Equal Size for Years 1919 and 1926

	No. 6 Furnace	E Furnace
Diameter of hearth.....	20 ft. 9 in.	20 ft. 9 in.
Average daily production, tons..	600	721.6
Total ore, cinder, scale, etc.....	4,661	4,235
Gross coke, lb. per ton.....	1,972	1,877
Net coke, lb. per ton.....	1,972	1,871
Limestone, lb. per ton.....	673	801
Scrap used over produced, lb. per ton.....	— 48	+ 7
Flue dust produced, lb. per ton..	257	265
Flue dust used.....	159	250
Mesaba ore, per cent used.....	100.00	74.7
Cubic feet of wind per minute...	44,726	51,860
Temperature of blast, deg. Fahr.	1,114	1,201
Actual yield of metallic mixture	48.91	52.7

The development of the blast furnace hearth, credit for which rests with the Edgar Thomson plant of the Carnegie Steel Co., and later with the South Chicago plant of the Illinois Steel Co., dates back over two decades.

No discussion of the present features of operation is complete without some history of the development, including an analysis of the operating difficulties and the steps taken to overcome them.

[The author here recites the history referred to and the questions brought up in the foregoing paragraph].

Operation of the Furnace

As noted in the foregoing description of the furnaces and auxiliaries, the furnaces are amply provided for in all of their requirements as to heat, wind, filling, distribution, etc. Their lines are almost identical with furnaces of similar size operating, coke excepted, on very similar raw materials. Therefore, it may be assumed that any deficiencies occurring in the operation of the furnaces are due either to the difference in coke quality or to the method of operation. All of the iron produced is basic pig iron and in the operation it is endeavored to maintain the silica content of the iron at its proper low limit by increasing the burden rather than by increasing the basicity of the slag. This method is generally recognized as the most economical in coke and the most productive in quantity of iron. Regularity in the movement of the furnace is of first importance in this operation, for with fine Mesaba ores, checking and rolling result in a large production of flue dust.

Production of Iron

The quantity of iron possible to produce from a given furnace is dependent upon the chemical and physical properties of all raw materials used. The main properties of the raw materials which affect this feature of operation are fineness of ores, reducibility of ores, size and strength of coke, ash and sulphur content of coke, combustibility of coke, size and purity of limestone, and last but not least the maintenance of uniformity of all materials.

Table B gives the average records of Carrie's large hearth furnaces over the entire period of their operation, and in addition gives the individual records of their highest average production for a period of one month. These productions are comparable with equal

size furnaces operating on soft ores and using coke made from 100 per cent high volatile coals. They are, however, somewhat less than that of furnaces using the same ores but using coke made from a mixture of high and low volatile coals. This indicates that such coke is superior to Clairton coke in quality. This conclusion is further strengthened by the experience of the Jones & Laughlin and the Weirton plants, that have operated on both types of coke.

[The coke rate and the blast temperature are then discussed].

Flue Dust Produced and Consumed

Carrie's flue dust production is high, the amount produced ranging around 400 lb. per ton. Flue dust has been used in varying amounts throughout the campaign of these furnaces. They are now using about 50 per cent of the dust produced, and it is found that attempts to use higher quantities have resulted in more than proportional increases in flue dust produced. There seems to be a cumulative action in dust production which indicates in this operation that 400 lb. per ton is about the maximum dust production permissible. If the production exceeds this figure for a continued period inferior furnace operation results. The flue dust problem in general has become increasingly serious with the present use of higher winds.

[At this point there is a full discussion of movement in the furnace].

Conclusion

Analysis of the operation of the blast furnace is a very difficult task. The chemical and physical properties of the burden materials impose their different tendencies upon the furnace in many ways. The variations existent in these properties combine to produce marked swings in the operation, which often mask the results of changes to such an extent that conclusions drawn may be wholly wrong.

These conditions are responsible for the wide difference of opinion sometimes held regarding the various phases of operation. J. E. Johnson, during his investigations concerning the properties of alumina in the slag, remarked that since so many operators regarded it as a base and equally as many regarded it as an acid, he was quite sure it was neutral, and later was able to give substantial evidence to prove his contention.

Another difficulty confronting the investigator is the human tendency in making comparisons to see only the worst in his own operation and the best in the other. My effort has been to eliminate such tendencies in every way, but I am not at all certain of having attained complete success.

Finally, the value of making comparative analyses on operations can well be considered equal to that of costs. The theories developed in explaining the detrimental effect of various factors upon the operations often become the basis for changes which result in minimizing to a great extent the difficulty experienced. It is hoped that this paper may in some manner prove of benefit to such developments.

Discussion

George M. Hohl, superintendent blast furnaces, Bethlehem Steel Co., Bethlehem, Pa., pointed out in connection with large hearth furnaces using coke from high volatile coal that the cost sheet is the real judge of value of any changes which may be made. Pro-

Table B.—Data Concerning the Performance of Carrie Furnaces on Their Present Linings

	No. of Months Oper- ated	Aver. Daily Prod.	Gross Coke	Coke Screen- ings	Net Coke	Scrap Used Over Prod.	Flue Dust Prod.	Flue Dust Used	Cu. Ft. Wind per Min.	Blast Temp.	Press.
No. 1 Furnace average on Lining.....	15	680	1,975	124	1,851	+60	319	190	49,206	1,017	20.3
Best month.....		734	2,020	150	1,870	+76	234	186	51,626	1,178	20.5
No. 2 furnace average on Lining.....	19	644	2,098	120	1,978	+36	380	112	47,712	977	19.7
Best month.....		703	1,974	103	1,871	+62	404	233	49,690	890	19.8
No. 6 furnace average on Lining.....	5	689	2,126	114	2,012	+ 1	334	111	48,297	1,037	21.3
Best month.....		727	1,980	132	1,848	+46	340	175	50,742	954	22.3
No. 7 furnace average on Lining.....	7	715	2,086	124	1,962	+28	374	116	50,066	1,052	20.5
Best month.....		752	2,068	150	1,918	+51	386	60	51,251	1,049	21.1

duction has to be high to reduce the unit interest charges on a large investment. Test runs of great daily output are of interest to the management, as showing what can be done in producing lower costs per ton, etc. Otherwise, they have comparatively little value.

This was in reference to a statement by Mr. Lose, not covered in his paper, that the best run for one day on No. 7 furnace had produced 1263 tons of iron. Of this amount about 820 tons, it was calculated, was made from ore, the remainder from scrap. Of the latter, about 75 tons went into the ladles.

For hard ores, Mr. Hohl considered a bosh angle of $78\frac{1}{2}$ to 80 deg. as the best possible. This angle does not apply, however, in any similar way to Lake ores. In the same way, for hard ores the batter in the shaft of the furnace he finds best at from 0.6 to 0.75 in. per ft., whereas a greater batter is better for Lake ores. He reported on one furnace in which the batter had been reduced to 0.4 in per ft. In a campaign of $3\frac{1}{2}$ years this furnace had always proved the smoothest working unit in the plant. He reported slips as virtually unknown with hard ore.

Much Higher Blasts Coming Into Vogue

Blast provided in earlier furnaces was on the basis of some 48,000 to 50,000 cu. ft. per min. as the top limit. Today 51,000 ft. is a common figure, and one furnace in his plant is designed for 65,000 ft. In a large furnace with 19-ft. hearth diameter and 23-ft. bosh, the furnace being 100 ft. high, as much as 74,000

cu. ft. per min. has been used as an average for a month, and this does not appear to be the limit.

Production of iron is limited by the amount of coke which can be burned, and this depends upon the wind supply. In one furnace the 1926 operation for a month showed 514 tons of iron per day and 15,900 tons per month, with an average of 41,580 cu. ft. of blast per min. The same furnace during a month in 1927 has averaged 713 tons of iron per day, or 22,100 tons in a month, with an average for a month of 56,780 cu. ft. of blast, or nearly 40 per cent more than a year ago. Meantime the coke consumption per ton of iron was decreased 226 lb. Total costs under this forcing regime have been found better all along the line. There is better and more uniform iron produced with the large furnace, and the speaker believes that a hearth of 21 ft. 6 in. diameter and a blast of 70,000 cu. ft. per min. is not the maximum to expect.

William A. Haven, superintendent of Northern furnaces, Republic Iron & Steel Co., Youngstown, pointed out that soft friable coke is a considerable handicap to smooth furnace operation. Using Lake ores, he reported a batter of 0.8 in. per ft. to give excellent results. With one furnace the coke consumption per ton of iron during the first four months of the campaign was 1770 lb. Production of dust by this furnace was given as 226 lb. per ton of iron, or not much more than half that reported for some instances by Mr. Lose. His blast temperature was given at 1100 to 1200 deg. Fahr., the pressure being 15.3 lb. per sq. in., and the volume 51,000 cu. ft. per min.

Pilger Tube Mill of the Pittsburgh Steel Products Co.

BY W. C. SUTHERLAND

WITHIN the past few years many improvements have been made in the methods used to extract oil from the ground, and probably one of the most important of these has been the development of rotary drilling, by means of which it has become possible to descend to depths only dreamed of before, so that nowadays drilling to a depth of a mile and a quarter and a mile and a half in quest of oil is the rule rather than the exception in a large part of the oil producing districts of the world.

With the advent of this deep drilling came the need for stronger pipe, both for the drilling operation itself and for casing and tubing. Welded pipe had long been the only kind in suitable sizes available, but the new requirements demonstrated that at a suitable size and weight welded pipe did not have the desired and necessary strength for the severe strains to which it had to be put. The very nature of its manufacture required soft weldable material, therefore stronger welded pipe could be obtained only by increasing the wall thickness, and this could be done only within well-defined tolerances, inasmuch as a large portion of the pipe must be capable of telescoping with other pipe in the natural process of drilling and casing a well.

It being a well-known fact that seamless tubing

could be successfully made from practically any grade of good quality steel, oil producers turned their attention to the seamless tube industry for a solution of their problem. The latter recognized the fact that there was a demand for a high class product in a heretofore unsuspected field, but it also found itself unprepared; the demand was for large pipe as well as small pipe and about the largest size of seamless tube which had been made up to that time, in the United States, was of 8-in. diameter.

The largest size which the Pittsburgh Steel Products Co. had ever made was of 7-in. diameter, and the oil industry was demanding seamless pipe up to and even beyond 13-in. Only a few of the American seamless mills were equipped to produce as large as 8-in. pipe by the established automatic rolling mill method, and at that time the possible length that could be reached was barely 30 ft. Almost simultaneously with the inquiry for seamless pipe and casing came the inquiry for longer lengths, up to 46 ft.

The officers of the Pittsburgh Steel Products Co. promptly instituted a thorough study, both in this country and abroad, of the various processes of making large seamless pipe in lengths as long as the trade might ask for and decided that the Mannesmann Pilger



MR. SUTHERLAND is a native of Wisconsin and a graduate of the University of Wisconsin in 1900. He began with the Illinois Steel Co. at its South Chicago works in 1901, as a chemist. After six years, he went to the Tennessee Coal, Iron & Railroad Co. and about 1910 with the Gary Plant of the Illinois Steel Co. In 1917 he became associated with the Pittsburgh Steel Products Co. as superintendent of the Allentown works, then under construction. On February 1, 1926, he was appointed general superintendent of the Pittsburgh Steel Co.

process offered the most advantages, inasmuch as by this process large diameter pipe, true to size and gage in extra long lengths, could be produced direct from the ingot, and the product would have a uniformly good finish.

This investigation resulted in the purchase of one of the most modern Mannesmann Pilger mills obtainable in Europe. Many parts of this new equipment were specially designed for this particular installation, which is capable of producing pipe from 6 to 12 in. in diameter.

This new seamless tube manufacturing plant was purchased complete, as a unit, including the electrical, hydraulic, and pneumatic equipment, and was erected at the Allenport Works of the company at Allenport, Pa., in 1926.

(An article describing this plant was published in THE IRON AGE of Sept. 23, 1926, page 846.)

Discussion

E. T. McCleary, vice-president Youngstown Sheet & Tube Co., Youngstown, reported upon the operation

of a Pilger mill in his plant in 1926, for pipe of 7 to 13 in. outside diameter, and of an American type of mill for pipe from 2 to 7 in. The Youngstown plant uses round ingots made in open-hearth furnaces. These ingots are heated in recuperative type furnaces in which the heating chamber measures $10\frac{1}{2} \times 79$ ft.

In the Pilger mill the pierced tube has a wall thickness of 5 to 6 times the finished tube wall thickness. With the American type mill, however, the pierced tube has only about $1\frac{1}{2}$ times the wall thickness finally required. The equipment for the Youngstown mills came largely from Germany. He reported, however, that replacement parts are being provided by American manufacturers and that in some cases they were proving better than those furnished by the manufacturers of the original equipment.

In discussing the genesis of the process, he pointed out that the first patent, in 1886, issued in Germany to the Mannesmann Brothers, resulted in a machine which was not at first very successful. It took later developments, obtained as a result of further experiment, to make the machines commercially applicable.

Centrifugal Casting Processes Reviewed

BY JOHN D. CAPRON

SINCE the inception of the foundry industry a large proportion of the castings produced have been annular in form. Undoubtedly, in early times before advances in foundry practice made it possible to cast intricate sections, the proportion of circular castings was even greater than it is today. It is not surprising, therefore, that early foundrymen were much interested in the development of a process which would improve castings of this type or reduce the cost of producing them.

We are accustomed to think of centrifugal casting as a new development in the industry and so little has been written on this subject that it is only recently that it has attained the dignity of a separate heading in the various technical indexes of the country. However, we should not overlook the early pioneers or their inventions.

[The main part of the early portion of this paper deals with the history of the various processes and attempts to make centrifugal castings up to the introduction of the DeLavaud process. The names of Eckhart, Lovegrove, Johnson, Bessemer, Whitley, Chalmers, Hooper, Sebenius and others appear. Then follows a description of the DeLavaud process.]

Effect of the DeLavaud Process on the Iron

The DeLavaud process was developed essentially to give a method of economically casting pipe of uniform section. However, the force under which DeLavaud pipes are cast, as well as the action of the cold mold and subsequent annealing, improves the physical properties and microstructure of the iron to a marked degree.

It has been stated that "the high tensile strength of the DeLavaud pipe is undoubtedly due to this unusual combination and arrangement of structural elements." The reduction in the size of graphite flakes is obvious under the microscope. In this connection it is well to recall Professor Sauveur's statement regarding the effect of graphite on strength, "There is no doubt but that, other things being equal, the finer and less angular and sharp the graphite particles, the stronger must be the iron."

The iron used in the process is the same as that used in making sand cast pipe. Test bars were poured from this iron before it entered the centrifugal machine. An average of nine bars, each 1 in. by 2 in. in section, placed flat and supported on 24-in. centers loaded at the middle supported a load of 2087 lb. with a deflection of 0.46 in. (a)

(a) This test and those which follow are taken from the Underwriters' Laboratories Report on DeLavaud Cast Iron Underground Water Pipe, Extinguisher No. 758, June 12, 1923.

After being cast into pipe by the DeLavaud method, transverse test bars were cut from the walls. These bars were $\frac{1}{4}$ in. by $\frac{1}{2}$ in. in section and were supported on $11\frac{1}{2}$ -in. centers. Each of the bars tested failed between 225 and 250 lb. load. These tests indicate an increase of strength of 65 per cent, as shown by the MR of 37,000 lb. per sq. in. for the first bars and MR of 62,000 lb. per sq. in. for the bars after centrifugal casting. Tensile bars cut from these test sections show similar results. The untreated iron had an average tensile strength of 20,242 lb. per sq. in.



MR. CAPRON completed a course in mechanical engineering at the Sheffield Scientific School of Yale University in 1914. For a short time he served as a private in the air service of the United States Army, but with this exception he has been connected continuously with the United States Cast Iron Pipe & Foundry Co. During the last two years he has acted as research engineer. He is a member of the technical committee of the Cast Iron Pipe Publicity Bureau, as well as the American Foundrymen's Association and the American Standardization Committee on Soil Corrosion.

compared with 35,658 lb. per sq. in. for bars cut from the completed pipe.

In considering these tests it should be borne in mind that the strongest part of the DeLavaud metal, the outer layer, has been removed by machining. For this reason actual bursting tests on the DeLavaud pipe are far more indicative of its true strength. Full 12-ft. lengths of pipe were tested. The bell end was threaded and a threaded cap was screwed in place; the spigot end was closed by means of a stuffing box held in place in the regular foundry test press. This type of testing apparatus limits the stresses in the pipe to those imposed by the internal test pressure.

Tests on Strength of Pipe

	Average Minimum Wall Thickness, in.	Average Bursting Pressure, lb. per sq. in.	Average Tensile Strength, lb. per sq. in.
6 in. Sand Cast Pipe	0.50	2475	14,600
6 in. DeLavaud Pipe	0.39	3730	29,200

As a result of an independent investigation, Professor Gillespie of Toronto University summarized the change in physical properties resulting from the DeLavaud process by stating "the strength in tension and cross-bending, the resistance to shock and the stiffness are about twice as great for machine made iron as for the sand cast product."

DeLavaud pipe fulfills the expectations of the inventor in that it is remarkably uniform in thickness. Variation of thicknesses average under 0.02 in. throughout the circumference. When we consider that sand cast pipe often varies as much as 0.12 in. circumferentially the accuracy of DeLavaud pipe becomes more apparent.

DeLavaud's hope for economy has also been fulfilled and pipe cast by his method is sold at a lower cost per foot than the heavier sand cast pipe. This saving has been made possible, however, by numerous improvements in the details of the process itself. In 1919, the plant at Toronto was turning out 15 pipes in an hour; today the regular output is more than double this figure for 6-in. pipe. Obviously the process is no longer in the experimental stage and there are now many thousand miles of DeLavaud pipe in sizes from 4 in. to 20 in. giving satisfactory service here and abroad.

Where the DeLavaud Process Is Used

At present there are eight companies operating under the DeLavaud patents for making cast iron pipe:

The United States Cast Iron Pipe & Foundry Co.: Plants at Birmingham, Ala., and Burlington, N. J.

The National Cast Iron Pipe Co. (Sub-licensees of the above company): Plant at Birmingham.

The Stanton Iron Works Co., Ltd.: Plant at Stanton, England.

Tsuda & Co.: Plant at Osaka, Japan.

The National Iron Corporation, Ltd.: Plant at Toronto, Canada.

Compagnie Générale des Conduites d'Eau: Plant at Liège, Belgium.

Hoskins Iron & Steel Co., Ltd.: Plants at Sydney and Lithgow, Australia.

Gelsenkirchener Bergwerke: Plant at Gelsenkirchen, Germany.

Other Modern Centrifugal Processes

[Under this head the "Sandspun" or "mono-cast" process is discussed. A complete description of this was published in *THE IRON AGE*, April 15, 1926, it being the new plant of the American Cast Iron Pipe Co., Birmingham. Other processes mentioned are: Henry Wetling-Peake, Stokes, Hurst-Ball, McConway & Torley and the Wasson piston ring process.]

As is the case with steel, non-ferrous alloys are melted in "batches" and, therefore, it is difficult to have available a continuous supply of molten metal such as is desirable for centrifugal casting processes. Yet, in spite of this handicap, centrifugal processes are in use in other industries. The difficulty of producing perfect brass and bronze tubes by ordinary methods has long been recognized. Since 1918 experimental work on the development of a centrifugal method for casting such tubes has been under way.

Centrifugal force has also been used to produce aluminum and monel metal tubes, copper bands and large cast iron paper rolls. Unusual applications of centrifugal casting include the manufacture of concrete pipe, the casting of babbitt bearings and the application of wax coatings to the outside of paper rolls.

Objects of These Processes

Professor Sewicki, the first authority to write exhaustively on centrifugal castings, listed the objects of this process as follows:

1. To produce dense castings, free from blow holes and as a result having greater strength.
2. The elimination of the use of a core, resulting in economy of operation.
3. To fill the molds completely and insure sharp outlines in the castings.
4. To influence the chemical changes in the metal during casting.
5. To make possible the combination of two or more metals in a casting.

It is interesting in considering the various processes described to note how successfully each of the methods attains one or more of these objects.

Discussion

James T. McKenzie, metallurgist, American Cast Iron Pipe Co., Birmingham, sent a written discussion which was read by the secretary of the institute, E. A. S. Clarke. In his communication, Mr. McKenzie expressed regret that more credit had not been given in Mr. Capron's paper to the work of Professor Talbot. He referred particularly to a paper read in 1922 by Professor Talbot before the American Water Works Association. This paper contained a fine comparison of cast iron pipe by the centrifugal process with regular foundry pipe, based on a large number of tests of pipe received from many manufacturers. The writer expressed the belief that the paper mentioned was the most extensive piece of literature on the subject.

Gas Permeability of Refractory Brick

BY F. A. WICKERSHAM

ENGINEERS and plant executives, who have made a study of fuel conservation, are familiar with the fact that a large amount of heat is lost in industrial furnaces through leakage of gases through the brickwork of the furnaces. This leakage is generally attributed to poor construction of the walls, bad joints between the bricks, or cracks in the brickwork. Few realize to what extent the heat losses are due to actual passage of gas through the bricks themselves.

The leakage of gas through bricks may be easily demonstrated by a few simple tests. If a small funnel is placed against one face of certain kinds of ordinary refractory bricks and a tight seal is made around the edges of the funnel with paraffin, it is possible, by blowing through the funnel, to blow out a lighted match or candle with one's breath. It is also possible to blow smoke from a cigar through the brick, while

ordinary fuel gas may be blown through and ignited on the opposite side.

The passage of gases through bricks is not, as most people believe, entirely due to intercommunicating openings or pores in the bricks themselves. The openings do have their effect, but the flow of gases is also dependent on a kind of diffusion, or what may be called osmotic effect.

Gas Permeability of Open-Hearth Bricks

The investigation of the gas permeability of bricks was started as a result of a study of the heat losses in an open-hearth furnace, particularly in the flues and regenerator chamber walls, or that portion of the furnace below the floor level. The open-hearth furnace at best is only about 18 per cent efficient, and any reduction of heat losses will immediately show up in



MR. WICKERSHAM is assistant to Dr. John S. Unger, manager Central Research Bureau of Carnegie Steel Co., Pittsburgh. He has been associated with this company for twenty-seven years, starting at the Homestead works in 1900. It was at that plant that he was employed until the establishment of the Central Research Bureau during the latter part of 1908, and since that time he has been doing work under the direction of Doctor Unger.

a saving in fuel. In this study it was developed that in addition to the air drawn in through the saucer of the air valve, almost 100 per cent excess air was being drawn in through the walls and flues between the air valve and the furnace proper. A similar condition was found on the out-going end, the volume of waste gases being almost doubled between the furnace and the stack.

This meant that the furnace was being operated under conditions that would require considerable excess fuel. On the in-coming end there was so much air passing through the regenerators, it was impossible to preheat all the air to the desired degree of preheat. On the out-going end, the hot waste gases were diluted to such an extent that they were unable to heat up the regenerators to the desired temperature.

The brickwork in this furnace was in particularly good condition. Before making the test, all apparent cracks were carefully sealed, and the furnace put in as good shape as possible. While some the leakage was no doubt due to cracks that could not be seen or poor joints, it was apparent that some must be due to leakage through the bricks in the wall.

A study of the literature on the gas permeability of bricks showed that the work most frequently cited was a paper read by S. Wologodine before the London Congress of Applied Chemistry in 1909. Recently work of a similar nature has been carried out at the Engineering Experiment Station, University of Illinois, and at the Tohoku Imperial University in Japan.

Aim of This Investigation

The present investigation was made to try to imitate in a practical way what might be expected of bricks in actual service. The objection may be raised that the investigation was not scientifically accurate, but it is believed the results obtained would be closely approached under actual service conditions. With a few exceptions, the work was carried out on full size bricks taken at random from the stock on hand.

[The author devotes the main portion of his paper to a description of the apparatus and methods and the details of the investigation. He takes up the effect of area of brick, effect of differences in pressure, relative permeability, effect of thickness of the brick, heat insulating brick and effect of mortar at the joints.]

Permeability to Gases Other Than Air

The gases available for test were by-product coke oven gas, commercial hydrogen, carbon dioxide, butane and acetylene. Tests made by passing these gases through different bricks are shown in Table H (in the paper).

The by-product coke oven gas used had a density of approximately 0.33 with air at unity. The densities generally given for the other gases when pure are:

Acetylene	0.91
Hydrogen	0.069
Carbon dioxide	1.53
Butane	2.07

While the gases used in these tests were not pure gases, besides containing more or less water vapor by

being confined in the gasometer, it is evident from the results that the time for a given amount of gas to pass through a brick bears no relation to the density of the gas. This is in accordance with the findings of Bunsen and other investigators, who have proved that the flow of gases through a porous material depends more upon the physical character of the gas than it does upon the density.

[At this point the author takes up the permeability of brick at elevated temperatures and the prevention of the flow of gases through brick.]

Discussion

Assisted by Dr. J. S. Unger, Mr. Wickerham staged two demonstrations of the gas permeability of refractory brick which created much interest, using a silica brick with a tube affixed to one of the broad surfaces. He applied his mouth to the other end of the tube and was able to blow out, through the brick, a lighted match held on the other side. In the other case he attached a small container of gas to the tube and, after allowing it to flow for a few seconds, was able to light the gas on the far side of the brick.

Special Coating Recommended

In discussing this paper, Kenneth Seaver of the Harbison-Walker Refractories Co., Pittsburgh, pointed out that the experiments reported in the paper had been made at pressures of 14 to 28 in. of water, which is very greatly in excess of the 2 or 3 in. maximum pressure encountered in most furnaces. [These high pressures were used by Mr. Wickerham to cut down the long time which the experiments otherwise would have required, he explained, in presenting his paper.] Mr. Seaver recommended the use of brick set closely together, with well-filled joints and with a slurry coating, both inside and outside. This coating will fill a large proportion of all the surface pores of the brick and thus will greatly diminish its permeability to gases.

Heat Loss the Principal Detrimental Effect

M. L. Bell, of the General Refractories Co., Philadelphia, pointed out that air or gas passing through a brick from a tube, such as Mr. Wickerham used, takes the form of an expanding truncated cone, the limits of which are set by the size of the brick. What is significant in connection with the whole matter, however, lies in the heat losses, either through infiltration of air into the furnace chamber or passages, or the escape of heated gases outward. In this connection, however, he believes that the loss of heat is not so great as might be expected in the furnace proper, because of the quickness with which the inner surfaces of the brick acquire a glaze from the intense heat to which they are subjected. In a regenerator chamber, however, the temperature is not high enough to form this vitreous glaze.

He believes that it will be more practical to use a mortar than to try to change the structure of the brick itself.

Our Industries Entering a New Era

Head of National Industrial Conference Board Sees a Turning Point and Finds Some Tendencies That Are Not Reassuring

MEMBERS of the National Industrial Conference Board and their guests listened to an able analysis of the present situation in industry and some of the problems it presents, at the eleventh annual meeting of the Board, held at the Hotel Astor, New York, on Thursday, May 19. President Magnus W. Alexander has made a number of notable contributions to the discussion of economic trends in this country since the war. To his address of last Thursday he gave the title, "American Industry at a Turning Point." The thought he stressed is that industry is gradually entering a new and different period of development. Students of economics, he said, have been asking how much longer we shall be able to keep up what appears to them to be our running counter to economic law. In presenting examples of apparent anomalies, he asked these questions:

Some Paradoxes in Industry

"Why is it that in the face of most liberal spending the United States shows such an increase in savings, whereas in Europe where thrift has been so much emphasized and practiced, actual savings have gained so little?

"Why is it that the United States, in the face of the highest wage scales in the world and with a wage level that is rising, shows a declining level of wholesale prices and is the only country to show such a condition?

"Why, with the purchasing power of the American farmer at a low ebb—bearing in mind that agriculture normally exerts a purchasing power of nearly 10 billion dollars worth of goods and services of other groups annually—and with buying power throughout most of the world below normal, have we been able to maintain so high a level of industrial activity?

"Why is it that, in the face of high tax burdens, high wage rates and salary levels and a declining price level, business has in most lines been able to earn fairly good profits?

"Why, with employment during the last winter fully 2½ per cent lower than the average for the winter of 1914-1915, was the United States in a critical situation then and in an apparently prosperous condition now, and why is the falling index of employment no longer indicative of a condition warranting alarm?"

Two Eras Since 1870

In referring to the belief growing among economic thinkers that industry in the United States is moving toward a state in which disregard for tradition will be increasingly manifest, Mr. Alexander characterized the two most recent periods in our industrial history. The 30 years preceding 1900 were the period of exploration, exploitation and risk-taking. It was an era of cut-throat competition, of self reliance and of laying foundations of subsequent growth. The twentieth century thus far has been an era of tightening slack, of conserving resources, human and material, and of introducing scientific management methods. Fact finding and scientific research have been supported to an extent never attained before. It is a time in which the life of the people shows the attainment of more satisfactions than have been possible in the past. Business is conducted along more efficient lines and employment is more regular and more secure. One of the great industrial leaders of our country says that we ought not to have any more panics in business, but if we do

have them it will be because they are man made, not because they are natural phenomena.

Tendencies That Are Not All Gain

"In the wake of higher earnings," said Mr. Alexander, "higher standards of living and great leisure have followed new national habits which, wisely applied, will mean great social gain, but unwisely used may lead to social and economic retrogression.

"We are developing the trait of spending before earning, and while installment buying, which is now running in excess of six billion dollars per year, has greatly widened the market for consumer goods, no one knows just where it will lead us. Will this development of consumer credit prove a valuable gain or will it prove an illusion and a snare? What also shall we say of the new leisure which we have won in factory and mill and in the home? Are we making the best use of that surplus time or are we developing national habits of idleness and disrespect for intensive work, especially in the younger people who have come to a new heritage without fully understanding its significance or value, or being adequately prepared for it."

More White Collar Workers

On the one hand, the speaker showed, we have been fostering an aversion to manual toil and on the other hand have been sending more and more boys and girls to higher schools of learning. The class of white collared workers is steadily mounting. Between 1870 and 1920 the number of office employees and clerks per million of population increased in the ratio of 1 to 14. Between 1910 and 1925, their number in actual figures almost doubled. Clerical and sales employees in stores have more than doubled. While servants, housekeepers and stewards declined over one-third in number per million of population between 1870 and 1920, barbers, hair dressers and manicurists increased over three times and a further rapid increase has undoubtedly taken place since 1920.

Great Increase in Government Employees

The civilian army of government employees, Federal, State and local, has grown at such a rate that today approximately every ten persons gainfully employed in occupations other than government service support one person on the public pay roll. About one-fourth of all Federal, State and local net expenditure is now devoted to the single item of cost of education. The question may be raised whether all the individuals being sent to high schools and especially to colleges and universities have adequate capacity for learning or will be able to return in social value the money invested in them for advanced education. Less than four out of every ten persons in the United States in 1926 were gainfully employed, according to estimates of the National Industrial Conference Board. The remaining six plus were either living on the returns of investment or were being supported by others or at public expense. The gainfully occupied in 1910 numbered 38,167,336 persons, or 41.5 per cent of the then population. In 1926, the gainfully occupied were estimated at 43,600,000 persons, or 37.2 per cent of the estimated population of 117,136,000. In 1920, the percentage for Germany was 56.6; it was 44 for Great Britain and Ireland, 53.3 for France, and 46.8 for Italy.

Is the decline in the number of our gainfully occupied personnel in proportion to the whole population

between 1910 and the present time to be put down as a credit or a debit in our national economic ledger?

Unbalance in Agriculture and Industry

The speaker did not consider it a good sign that the farm, "the great breeding place of independent, resourceful and healthy citizenship, has been giving ground to the white lights of the cities and the farmer has been rapidly turning of late into a worker in the factory, mill and store, as the desire for higher money return and for greater participation in the whirl of pleasure in the cities has made the nation forget the compensating features that farm life holds out." He asked whether the marked unbalance in the return of agriculture and manufacturing signified merely the temporary instability of agriculture and recurrent failure of crops, or on the other hand a fundamental realignment in our basic economic life. "Is it tending to make our country at least partially dependent in the future on agricultural products of other lands?"

Changes Temporary or Permanent?

Coal mining and the building industry also raise questions. More mines are being worked than can be operated at a profit. In the building industry there is great danger of over-construction and especially of unproductive building because of its high cost, largely due to wage rates which at the end of 1926 were almost double those in manufacturing and fully 85 per cent higher than those in railroad transportation.

Citing the competition the railroads have in the motor truck and motor bus and the replacement of ice by the electric refrigerator, as well as cotton and silk by artificial silk, the paper questioned whether these and other industries affected by changes now in process are merely at a turning point to a new and prosperous development or doomed to diminishing returns and eventual elimination.

Concentration in Industry

A new type of management has come to the fore that recognizes all interests in industry and seeks to coordinate them. Its great responsibility appears from the fact that less than 3½ per cent of the factory establishments in the United States now employ over 53 per cent of all the wage earners in manufacturing. Plants whose annual value of product is \$100,000 or more are producing 93 per cent of the value of all manufactures and are employing 90 per cent of the 10½ million industrial wage earners.

"Are we now giving sufficient attention to the effective training of managerial assistants from the adjutants and divisional commanders in the industrial army down to the foremen as non-commissioned officers?" The more than 43 million persons engaged in gainful occupations must have practical training if they are to work efficiently and if at least some of them are to fit themselves for higher usefulness. "Is there not good ground for the thought that our educational system needs reappraisal in the light of our present day economic life and its requirements, and in respect to the probable tasks of the morrow as indicated by social and economic trends?"

Public More Favorable to Big Business

Another factor referred to was the changing attitude of the public toward so-called big business. The public is learning to recognize that the great modern inventions and improvements of which it is the beneficiary, could not have been made without the massing of capital. It is realizing that only by mass production, the employment of large numbers of workers and great installations of power machinery can the people buy the necessities of life at lower prices and acquire the degree of comfort they now possess.

In the concluding portion of his address, Mr. Alexander asked whether present day industrial management, seeing the changed popular attitude toward large scale industry, would hold fast to it and even strengthen it into a fixed national policy. Efficiency is the watchword of the day. It is being realized increasingly in the use of raw materials, in technical operation, in organization, in labor management, in the distribution of our domestic and foreign commerce, in the financial

field and in other ways. Its motive is not the salvage of scrap at the end but, through research and scientific knowledge, to foster such prevention at the source and such economic conduct all along the way that there shall be no waste at the end to be reclaimed.

A New Motive in Business

"We find that the more scientific attitude in present day business does not spring from competitive necessity alone, but that a new motive has arisen that is proving itself an increasingly powerful force in industry's conduct. The new force may be termed a more professional attitude of business toward itself, which sees in industry more than a medium for making profits by any means. It seeks a steady elevation of the standard of business conduct, because it has found that business cannot thrive long in a low moral atmosphere. It aims to develop self-government in business, not because it fears the growing weight of the club of government, but because it believes that industry, if it wills so, can be a more effective policeman and judge of its affairs than can government. It fosters greater social consciousness in business because it holds the interests of business and society to be interwoven and interdependent. What the ultimate effect of this new spirit in our industrial life will be it is too early to say, but it is certainly a future to be viewed with satisfaction in which, if the present tendencies are continued, each individual industry will more and more be guided by the policies of 'live and let live' and 'serve and thereby serve yourself.'"

"Economic life at present is in a state like that of molten metal being poured from a massive cauldron. What the ultimate molding will resemble, no one can say. Much depends on the intelligence, the stamina, the motive and the common sense of the molders, and on the spirit of the people and its government to give these molders a free hand within the limitations set by legal and moral law.

Having Had No Boom, the Country Is Not Facing Depression

Following the address of President Alexander, Virgil Jordan, chief economist of the Conference Board's research staff, discussed "Current Business Conditions and Trends," with special reference to the business cycle. As the following extracts will indicate, Mr. Jordan is not a friend of the cycle theory:

"The business forecaster who attempts to comment on the outlook for the rest of this year and for 1928 is up against it, if he relies upon most of the current and fashionable methods. For some reason the old medicine no longer works and has not worked since 1924. On the other hand, it is probably a little too early to say that the business cycle has altogether lost its kick. Appearances are deceptive in this respect. In 1924 there was an industrial recession as marked as any in the pre-war years of this century and it appeared punctually enough to delight any of the prophets of the cycle; but it attracted little attention and did not last very long. The cycle devotees are looking forward to the end of 1927 and the early part of 1928 with a kind of joyous gloom, in hope that the gods will vindicate them again and bring forth a regular old fashioned depression.

"Yet I think they are likely to be disappointed. The next year will indeed be a critical one in some respects, but the outcome is likely to surprise both forecaster and business man themselves. There may be a slight further recession in business for a short time, but it is likely to end in a real business boom rather than in a genuine depression. The real readjustment is likely to take place chiefly in security and real estate values.

Past Two Years Only Normal

"The reason is that we have been partly mistaken about the past two years. Though they have been a period of high activity in some respects, it is probable that general business has been below normal or not much above normal during most of the time. These

(Concluded on page 1576)

Laclede Hot Rolled Strip Mill

Electrical Features of New Plant at Alton, Ill., for
Producing Strips Up to 12 In. in Width and
Down to 0.035 In. in Thickness

DESIGNED to improve finish, roll closer to gage, reduce camber and deliver in long lengths coiled, the new hot strip mill of the Laclede Steel Co., St. Louis, at its Alton, Ill., plant has applied the principle of four-high rolls to the manufacture of thin strip steel. Capable of rolling strips from 0.035 in. to $\frac{1}{8}$ -in. in thickness and up to 12 in. in width, the mill has been constructed principally to satisfy the demands of the stamping and automotive parts makers for greater accuracy in strip steel. Flexibility of operation and complete control of the mill through the use of variable speed motors also have been attained. The dominant idea in the design of the run-out and the hot beds is to effect almost perfect alinement and flatness in the finished strip, and a constant gage from edge to edge and along the full length of the strip.

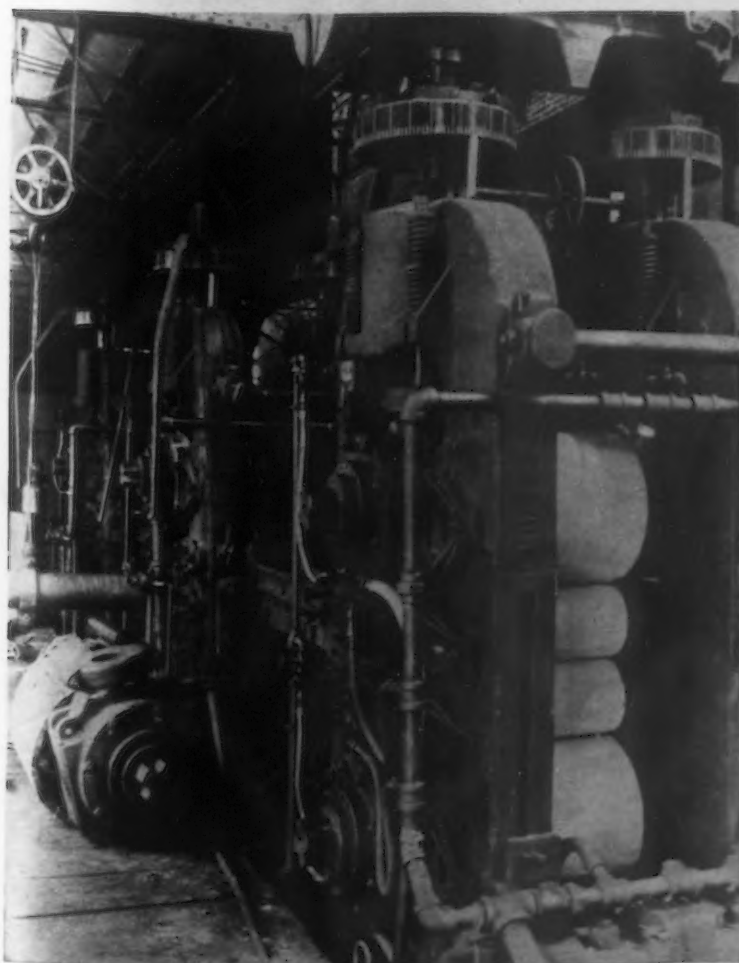
After being delivered from a Morgan continuous furnace, the billet, approximately 30 ft. in length, enters pinch rolls which carry it to a vertical edger and then to a flying shear to be cut into the required lengths. The billet is broken down in four stands of Morgan horizontal roughing rolls, the stands being spaced 3 ft. 4 $\frac{1}{4}$ in. apart. From the fourth stand the material goes a distance of 28 ft. 9 in. to an inter-

mediate horizontal stand in tandem with the other stands.

The finishing is through five four-high roller-bearing sets of finishing rolls, (the product of the United Engineering & Foundry Co., Pittsburgh) to a hot run table, from which the strips go either to the hot bed or to the coiler, depending upon whether straight or coiled material is being rolled.

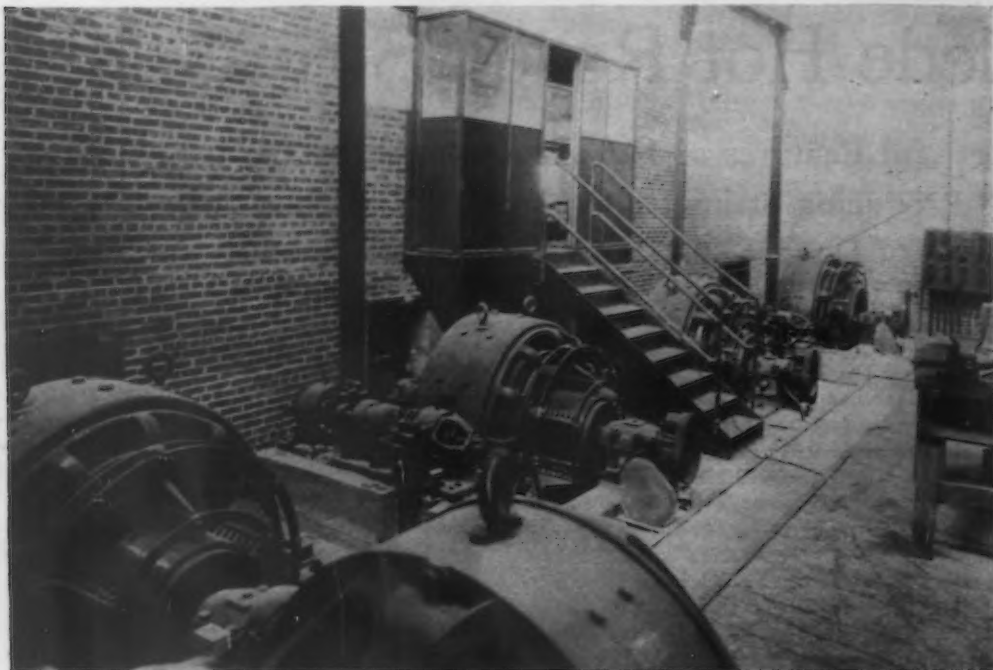
The delivery to the hot bed is by means of a mechanical throw-off. The strips progress across the hot bed by a shuffle bar actuated by three different motions, the first of which has a 7 in. stroke, the bar being lifted from notch to notch. The second and third sets of shuffle bars each have an eccentric stroke of 3 $\frac{1}{2}$ in. Delivery of material to four cold run tables, which parallel the hot bed, is made by an overhead transfer crane. From the tables the strips are carried to a battery of four shears. After shearing, they are delivered to back shear tables and are piled automatically.

Complete electrification of the mill has been provided for. No. 6 stand is equipped with a 1500-hp. direct-current 600-volt compound-wound mill motor, which, by means of a rope drive, also drives the four stands of the Morgan mill and the intermediate stand.



Pulpit Control Board

*Stands 8, 9 and 10 of the
Four-High Mill*



The Four Motors Driving the Finishing Mills, and Stairway to Operating Pulpit

Finishing stands Nos. 7 and 8 each are served by a 600-hp. direct-current 600-volt compound-wound mill motor, while stands Nos. 9 and 10 each have a 720-hp. motor of the same type. Edger No. 1 is driven by a 100-hp. direct-current 230-volt shunt-wound motor, edgers Nos. 2 and 3 having similar motors, but of 75 hp. and 35 hp. respectively.

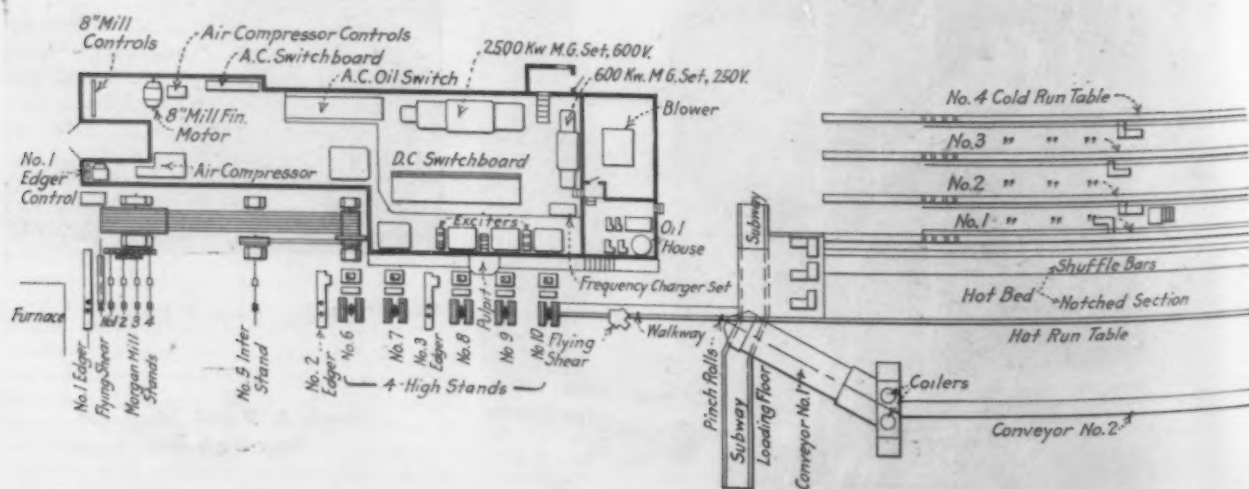
Direct current at 600 volts is supplied by a 2500-kw. motor generator set driven by a 2300-volt synchronous motor. The 230-volt motors receive current from a 600-kw. motor generator set driven by a 2300-volt synchronous motor. Both motor generator sets have two direct-current generators each.

Variable speed control of the mill and edger motors is exercised from a pulpit opposite No. 8 stand. From the pulpit board, approximately 9 ft. in length, the operator can start or stop the mill by means of Ward-Leonard control, while field control serves for varying the speed of any motor. For the purpose of operating stands Nos. 7 to 10 from one generator and stand No. 6 from another, the control board is arranged so that the operator can split the main bus between the motors on stands Nos. 6 and 7. In this way added flexibility in motor speeds is obtained, in that by carrying a voltage lower on one generator, the basic speeds of the motors being supplied by that generator can be lowered. Good speed regulation of the compound wound

mill motors is secured through the employment of series exciters, which vary the series field in combination with the shunt field.

Motors and motor generators are installed in a brick and steel building with a roof of saw-tooth design, the building being served by two 15-ton overhead traveling cranes. All conduit and bus work is installed in the basement in order to make it accessible. To assure as much freedom as possible from dust and dirt, self-cleaning air filters, manufactured by the Mid-West Air Filter Co., and a blower, the product of the American Blower Co., supply the motor room with 80,000 cu. ft. of air per minute. The air is delivered into the basement under pressure and then through ducts in the foundations of the motors and motor-generator sets into the motor room. At the end of the building opposite the fan house is an outlet for the air. If an increase in the capacity of the electric machines is desired at a later date, they will be equipped with end bells for forced ventilation.

Rollers in the hot run table are individually driven by $\frac{1}{2}$ -hp. three-phase induction motors, the current for which is supplied from a variable frequency generator driven by a variable speed direct current motor controlled by the pulpit operator. Certain rollers in the hot run table are insulated and used as flags for the operation of the throw-off. The control panels for the



The New Hot Strip Mill of the Laclede Steel Co.

auxiliary motors are installed in two brick buildings, one being the clean air compartment of the fan house and the other the second story of the warehouse office.

The Cahokia, Ill., station of the Union Electric Light & Power Co., St. Louis, is the source of electrical power for the new mill. Power is transmitted over two 66,000-volt, 60-cycle, three-phase lines to a substation adjacent to the company's plant. Here it is stepped

under pressure to the roller bearings of the four-high mills, to the bearings of the rope drive, and to the pinions and bearings in the pinion stands. The edgers and shears are lubricated by the Keystone manifold system, while all other equipment is greased through Alemite fittings. With the exception of the small motors on the run-out, all motors have ring-oil bearings.

The mill was designed and built by the United En-



Hot Bed and Transfer Crane Looking Toward Mill

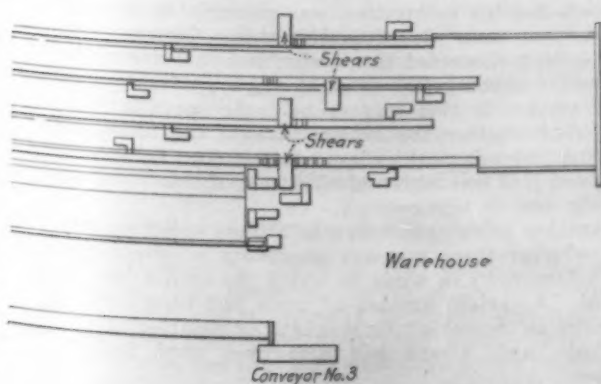
down to 33,000 volts. At this point the electricity becomes the property of the Alton Light & Power Co., from which the Laclede company buys its current. In the substation are two 3000-kva. three-phase transformers which further reduce the voltage to 2300 volts for transmission into the mill.

For the lubrication of the mill proper a central lubricating system, the product of S. F. Bowser & Co., Fort Wayne, Ind., has been installed. It supplies oil

engineering & Foundry Co., Pittsburgh, but installation of all mill equipment and auxiliary electrical equipment was made by the Laclede company. The Westinghouse Electric & Mfg. Co., Pittsburgh, designed and built the main electrical apparatus and installed the mill motors, generator sets and the main switchboard.

Three American Foundrymen to Present Exchange Papers

Three American foundrymen have agreed to present exchange papers before meetings of various European foundrymen's associations this year. J. T. MacKenzie, chief chemist American Cast Iron Pipe Co., Birmingham, is the author of the exchange paper to be presented before the Institute of British Foundrymen, July 5 to 8 in Sheffield. The subject is "The Properties of Coke Affecting Cupola Melting of Steel." Jesse L. Jones, metallurgist, Westinghouse Electric & Mfg. Co., East Pittsburgh, will present a paper before the Association Technique de Fonderie de France, which holds its meeting the second week in September in Paris. The subject selected by him is "The Effect on the Quality of Pig Iron of the Addition of Iron and Steel Scrap to the Blast Furnace." O. W. Potter, of the University of Minnesota, is the author of a paper to be presented before the Association Technique de Fonderie de Belgique, and he has taken as his subject "The Thermal Treatment of Gray Iron and Semi-Steel."



Is Arranged to Deliver Coiled or Flat Product

Live Topics in British Program*

Carnegie Scholarships Awarded—Spain Bids for Fall Meeting—Wire Drawing and Heat-Resisting Steel Discussed by Iron and Steel Institute

(Special Correspondence)

LONDON, ENGLAND, May 6.—At the opening of the second day's proceedings today the Carnegie scholarship awards were announced as follows:

David Binnie, Royal Technical College, Glasgow, £100, to carry out research work on behalf of the heterogeneity committee, to determine the liquidus solidus of carbon and alloy steels and to study the sulphides in liquid and solid steels.

B. S. Smith, Sheffield University, £100, to assist in carrying out research work on the viscosity of molten steel.

T. F. Pearson, Birmingham, £100, to carry out a research on graphitization on iron-carbon alloys.

Emanuel Valenta, Skoda Works, Pilsen, Czechoslovakia, £100, to study heat and acid-resisting cast irons containing chromium, silicon and aluminum.

G. R. Woodvine, Sentinel Wagon Works, Shrewsbury, £100, to study the influence of nickel on wearing properties of case-hardening steel.

Frederick Collis, £100, for research on heat treat-

ment, particularly with reference to blast furnace stoves.

The president announced that Lieut.-Col. Maurice L. Bell, Dorman Long & Co.; Albert O. Peech, chairman United Steel Co., and Dr. W. H. Hatfield, director Brown-Firth Research Laboratory, Sheffield, had been elected members of council of the Iron and Steel Institute.

Invitation to Hold the Autumn Meeting in Spain

Luis Barreiro said for some years past it had been the earnest wish of himself and his fellow members resident in Spain that the institute should once more celebrate a meeting in their country. The last meeting held in Spain took place at Bilbao in 1896, or 31 years ago. Accordingly, he extended, on behalf of his Spanish colleagues, an invitation to hold the autumn meeting in 1928 at Bilbao.

Papers on Wire Drawing, Heat-Resisting Steels and Others

ABSTRACTS and discussion of some of the principal papers presented at the second day's session follow.

The Drawing of Steel Wire

E. A. ATKINS, Rylands Brothers, Warrington, discussed the drawing of steel wire and its relation to qualities of steel with the object of (a) discovering the best and most economical method of producing clean steel for wire-drawing purposes, (b) showing the necessity of cooperation between the wire manufacturer and the steelmaker, and (c) dealing with problems from the works' point of view so as to enlist the help of the practical man.

Effect of Nickel, Copper and Tin

Wire drawn from oxidized steel has considerable torsional stiffness or rigidity, he contends, which is a useful property in wire for making the cheaper kind of cylindrical or conical springs which, in practice, twist only a few degrees. In the making of steel for ordinary wire-drawing purposes, the nickel content should be kept down to say, 0.10 per cent. The presence of nickel has a disturbing influence in connection with annealing.

Abnormal amounts of copper and tin in wire-making steel tend to make the edges of billets crack in the hot-rolling, resulting in roaks on the surface of the rod, which give rise to what is known as "herring-boning" on the wire.

In many cases high-class material has been spoiled through wrong treatment in passing through the various processes. As showing the varying physical properties of No. 16 gage mild steel wire under different conditions of heat treatment, reference was made to an untreated wire having a tensile strength of 64.3 tons per sq. in. and an elongation of 2.5 per cent, the wire giving 46 twists in an 8-in. length before breaking. After the heat treatment, the tensile strength varied between 34 and 35 tons per sq. in., the elonga-

tion between 12.5 and 22.5 per cent and the twists between 80 and 142.

Annealing Affects Grain Growth

In connection with the annealing of mild steel there is an extraordinary difference in the grain growth according as the area is reduced in wire drawing. Where three wires with respective reductions of area of 10, 20 and 30 per cent had been annealed at 690 deg. C., the number of grains to the square inch were respectively 252, 2100 and 3500. At the lower temperature, 590 deg. C., the wire, having a 10 per cent reduction of area, gave 4500 grains to the square inch.

Steels giving such varied results have often been denounced as worthless, whereas the problem is purely one of correct heat treatment. There are also cases where the steel of wire or strip has been described as bad, but has simply been made defective by being carburized by contact with carbon monoxide, either through cracked annealing pots or through overheating in the presence of fresh cast iron borings.

To and Fro Bending Test

Prof. Henry Louis, speaking from the users' point of view, said that on the question of testing, the author, like all English authorities, was strongly in favor of the torsion test. Recent authoritative German work had entirely discarded the torsion test in favor of the to-and-fro bending test at right angles, whereas most wire makers in this country held the opposite view. He asked whether the author thought the to-and-fro bending test was more or less valuable than the torsion test, and if it was more valuable, why it was not more largely used in this country.

Another point upon which he desired enlightenment was whether there was any possibility of discovering the hidden flaws in wires to which the author had referred. A certain amount of work had been done in America on the subject by magnetic or electro-magnetic methods, and X-rays had also been used for the purpose.

The statement made by the author in connection with the torsion test, that a wire of supposedly good

*The first day's sessions were reported in THE IRON AGE, May 19, p. 1447.

quality broke with a square or solid fracture, and that an inferior quality wire broke with a ragged fracture, was called attention to by W. H. Wilkinson. He had frequently found that wire which was extremely brittle and would only stand perhaps one snarl would give the requisite number of torsions and break with a perfectly solid fracture, whereas wire which gave the requisite number of torsions, breaking with a jagged fracture, was seldom found to be brittle.

Detecting Defects With X-Rays

Dartrey Lewis said the point in the paper which interested him most was the question of internal flaws. He wondered whether those internal flaws, which were actually cup holes in the wire, of which a specimen was shown on a slide might be detected by X-rays. Mr. Thomas, who was in the radiological research department of Woolwich Arsenal, cut down longitudinally a $\frac{1}{2}$ -in. piece of iron rod and drilled three small holes in the surface, putting the two pieces together in that way. He then took an X-ray photograph through the steel with the object of seeing whether the small internal flaws would show. The result showed that internal flaws could quite readily be detected by means of X-rays.

Does High-Carbon Wire Draw More Uniformly?

A. T. Adam said the first point that struck him in regard to the nature of flow in drawing wire was that the high-carbon wire apparently drew more uniformly than the soft mild steel. His experiments always indicated that the sorbitic structure was the structure which flowed most uniformly, even more uniformly than ferrite. He noticed that the reductions at each stage of wire drawing were extraordinarily variable. He asked the author if that was intentional or, if not, why it was that the wire drawer apparently reduced the wire perhaps two gages sometimes and at another stage only half a gage. Also with regard to that particular sample of steel, he asked if it was water quenched. It seemed to start off with a tenacity of about 30 tons per square inch and go up to 60 tons with mild steel of 0.10 per cent carbon.

Hard to Find Steel That Cannot Be Drawn

Turning to the question of oxide inclusions, perhaps he had been more fortunate than the author in the steels that he had annealed, as it was very rare that he had found steel that simply could not be drawn. On one occasion he found that a casting, which had been given up as hopeless from that point of view, was put aside, and about six months afterward, for some reason or other, an attempt was made to draw it again, and that time it drew beautifully. He did not know what the cause of it was but he imagined that the weathering had helped to clear the surface considerably of some of the body scale. It had gone rusty, and was red with rust. He did not mean to dispute in any way the author's conclusions regarding aluminum oxide and specks. He did not know to what extent those inclusions affected the pulling out, but he had found when he had to rely on microsections to investigate wire steels that specks were nearly always present in every section he made.

On one occasion he complained about a steel being dirty and was told by an eminent metallurgist that he did not know how to polish sections. There might be some truth in that, but he thought there was also a great deal of truth in the author's contention. Personally, he thought it was possible to overpolish steels; it was possible to hide difficulties by covering up some of the surface defects; and he would be interested to hear what some of the steel experts said on that point.

Examine Structure of Wire Itself

One test which he had found very useful, probably more useful than microexamination of the structure, was to examine the structure of the drawn wire itself. He invariably found that dirty steel always gave a wavy structure, and that pure steel gave a very regular structure.

Without going into the merits of the question of the torsion test and the bend test, he said that if a bend

test was ever established in this country he trusted that the bending machine to be used and the method of making the bend would be most rigidly standardized, because it was possible to get tremendous tensions according to how the bending was carried out.

Cuppy Fracture Not a New Question

The question of cuppy fracture was one by no means new, said Dr. Walter Rosenhain, examples of it being described in connection with either the ninth or the tenth report of the alloys research committee in regard to aluminum bronzes. In those non-ferrous alloys cuppy fractures could be obtained where there was no question of cracks. He desired to ask the author whether internal cuppy fractures were not liable to be produced by wrong manipulation in the drawing, sometimes called overdrawing the wire. If the flow in the drawing was not sufficiently uniform it might easily happen that the extension applied to the central part of the wire was much greater than that applied to the peripheral parts. The flow of the peripheral parts was retarded by the heavy friction against the die itself, and if the relation of the force used, the angle of the die-plate and the reduction were not correct, he thought it was quite possible even in a homogeneous material to draw the core of the wire unduly fast relatively to the periphery and for the core to break up. He asked whether similar phenomena could not occur in a perfectly homogeneous steel so that it might not necessarily be right to ascribe cuppy wire to cracks.

He was particularly struck by the author's isolation of the crystals of aluminum oxide. Knowing as they did the tremendous abrasive power of very small particles of alumina, particularly if they were crystalline, one was not surprised to find that tailing of the wire was caused in that way. He desired to ask the author whether he had verified that fact by measurement of the draw-plate itself, in other words, whether he found in those wires that the whole aperture of the die had increased. He supposed almost inevitably that would be the case. It was just conceivable that a wire might, by some elastic deformation while drawing through, expand somewhat after leaving the die just as it might contract under other conditions, but he presumed in the present instance it was due to wear of the die caused by particles of alumina.

Doctor Rosenhain said he would be much happier to see minute inclusions of iron oxide in the steel than a good many other inclusions which were invariably met with in a greater or less degree. Deoxidation either by ferrosilicon or aluminum was a very satisfactory proceeding if it was possible to be sure of getting rid of the oxidation agents near it, but if it was done too late in the process or done under conditions which produced those minute inclusions which did not rise readily through the liquid steel it was certain that more harm than good might be done.

Electric Heat Treatment Being Used

Finally, the question of the rapid heating and cooling of wire and sheet was obviously of importance. It was equally obvious that, with a fuel-fired furnace, where comparatively large masses of wire or sheet were heated at the same time, neither rapid heating nor cooling was possible. Electrical methods were rapidly being used, particularly in America, and more recently in Germany, for annealing and heat treatment purposes, and he thought it was not impossible it might be found that electrical heating, particularly electrical induction heating, which developed the heat solely in the wire or sheet, applied not to masses or bundles but to individual pieces, might be a solution of the problem, which was obviously one of cost. If it was worth while it should surely be done.

There was one thing worth remembering when dealing with iron and steel as compared with other metals as regards electrical treatment, he said, and that was that particularly under the influence of larger frequency alternating current iron and steel heated up faster to the magnetic change point than did other metals. The magnetic effect on the iron accelerated the heating and increased the efficiency of the process very much, and that suggested that it was a possible

field of application of electrical heating which might solve some of the problems which had to be faced.

Non-Segregated Steel Can Be Had

E. H. Saniter thought one of the reasons why not much had been heard in the discussion of the point of view of the steel-makers was that the author had treated them in a very fair manner. It had been said that segregated steel must not be used for making steel wire. Although it was not strictly a proper thing to say at the meeting, he wished to inform the author that he could have steel without segregation provided he would pay the price.

The author had made some very interesting remarks with regard to the number of inclusions that occurred, he thought the number of 50 millions being mentioned for a cubic inch. Personally he would have thought that the inclusions under those circumstances must be as small as molecules. Some time ago he had three or four pieces of wire rope sent to him, one of which was said to be the best as regards the number of inclusions while another was said to be the worst. He submitted the specimens to five other observers, and not one of the five agreed as to which was the best. That was also his own experience of the micrographic examination of inclusions.

With regard to the question of oxide in steel, there was no doubt that the greater part of the wire drawn from mild steel in this country contained as much oxide as the steel could contain in its solid condition. There was no silicon added to the steel and it was full of blowholes before it was rolled; nevertheless he was sure the author would confirm him in his statement that there was nothing which drew better than a piece of ordinary mild steel, especially if it was of British manufacture and had not come through a Thomas converter from Belgium.

Some years ago he had one of these ingots sawn up, and toward the top end he found a piece of inclusion of about one inch in size where oxide of iron, which had gradually become less soluble as the steel cooled, had gradually gathered together. That inclusion consisted largely of oxide of iron, oxide of manganese and sulphur, and practically no silicon.

Question of Alumina Crystals

With regard to the question of crystals, he would like to ask the author if he realized that there was something like 100 per cent of alumina in the crystals referred to and whether he did not have a proportion of silica and manganese oxide or iron oxide. Some analyses he had made of inclusions from ingots produced under the same conditions generally showed a composition of a very considerable percentage of manganese, alumina and silica. He did not know whether the author could give the percentage of those crystals in his steel, but personally he had no doubt that such as they were, if they came in contact with the die, they would score it very badly. Of course there were other inclusions and other causes, particularly insufficient cleaning.

Steel Without Aluminum Rolls Better

Benjamin Talbot said he was particularly interested in the question of oxide of iron in solution in the steel. He had not seen any results with the pure form of ingot iron; he meant by that, iron which possibly had 99.8 per cent of pure iron in it. Some of that metal was heavily dosed with aluminum, and it would be quite interesting to see how that worked up under the treatment of wire drawing. Others had not any aluminum at all. In his experience of rolling that material, the one without the aluminum rolled much better than that which had some.

Cementite at Grain Boundaries

Dr. Thomas Swinden, Sheffield, said the point the author had made with reference to the cementite going out to the grain boundaries was very important. It was a thing he had noticed for many years. Personally he agreed with the author's opinion that it indicated that the cementite did actually move within the crystals below the change point. Some work done years ago on

the subject of black grain in wire distinctly supported that view.

He desired to confirm the author's point in regard to the failure of rope wire through misuse. He had had experience of three or four cases precisely similar to the one mentioned by the author in which the wire had been hardened on the surface and cracks penetrated to a distance but did not go through, and the wire had fractured and failed.

Alumina No Hindrance

Dr. W. H. Hatfield said he was not convinced with regard to the author's contention concerning the classes of the inclusions, particularly the inclusions of alumina. Not so very long ago he had experimentally produced a considerable batch of wire in which aluminum was present in considerable quantities. He did not at the time examine that wire for alumina inclusions, but he thought the inference was pretty clear that with steel heavily charged with alumina, the ingots must have a substantial amount of aluminum, and there was certainly no difficulty in drawing arising from that.

The Author Replies

E. A. Atkins, in reply, said that wire drawers had to produce wire to a torsion specification. They were told that the wire must stand so many twists in 100 diameters, and they had to produce it. He could say emphatically that, if the wire would only give 20 twists in 100 diameters and 30 was wanted, with a little drawing that 30 could be produced. That showed, of course, the value of the test.

American Magnetic Test

Professor Louis had mentioned the test in America by magnetic means. He had read the report of the Bureau of Standards on that matter, and he remembered the conclusion they came to, namely, after months of work they discovered the magnetic test gave results of no particular value; it was not possible to measure anything very definitely.

With regard to the venor contractor effect on wire, the conditions were somewhat different in drawing a piece of wire in a flow of water and extrusions; the material had been pushed out by pressure in the one case and the wire had been pulled out in the other. There was a very simple illustration of people crushing through a doorway, and to relieve the compression somebody outside started to pull people away and that was what happened in the case of wire. No reduction in the wire was found except in the case where it was very soft wire, and the pull had been rather jumpy, and the wire might have been reduced in diameter by actual elongation of the wire just at the point where it was leaving the die.

X-Ray Tests Impractical

With regard to the question of X-rays, it was certain that X-rays would discover any breaks in the center of the wire, but he could conceive it was going to be a terrible job to apply X-rays to a ton of 30-gage wire that might run into 300 miles. If it could be tested in the mass it would be all right, but it would be a very difficult matter to apply it practically, although the matter was worth while investigating.

There was no doubt that X-rays might be useful on the billets if they would show concentrations or something of that sort. There were so many tests in wire works by which it was possible to tell the quality of the wire, that he thought it was hardly necessary to apply X-rays. When wires were produced for a particular purpose a great quantity was rejected. Ten tons of wire might be tested and probably only 6 tons obtained from it, and the wire might be used up for some purpose which was not so important.

High-Carbon Wire and Flow

Mr. Adams had mentioned the question of high-carbon wire, that there was practically a "flow." That was what he had discovered. He did not say there was no "flow"; there was a differential flow between the surface and the core, but probably not much. That work took up a lot of time, and he hoped to carry out

further work in that direction, because he thought it was rather important.

Alumina Usually Found

The author said that in his paper he recorded that actual experiments were carried out by the addition of aluminum to the ingot molds in certain amounts and then the ingots were drawn down and rolled into wire and photomicrographs were produced in each case. Then the steels were dissolved and alumina crystals found. In every case where alumina was added to steel wire, he had found alumina crystals.

With regard to the specks and the kind of specks, he had had sufficient experience to know what that meant. He had had information sent to him from all over the world in respect of that material, and in 90 per cent of cases those who produced the figures were off the track. Those who polished for specks of that character had to be trained, and in his own steel works they had what they called a R. O. inspector, a "running out" inspector, who would polish a sample of a billet and write out his report and then go straight along until the wire was finished, and in 99 cases out of 100 if not 100, he could report that the wire would run out 1 mil or 2 mils, and it would be found that the result coincided with the report. It had taken years to get to know exactly what those specks were and detect them under the microscope.

Electric Heating Uneconomical

With regard to electric heating, it was being used at the present time for the heating and subsequent tempering of very fine wire, but it had been used in connection with heavier wire and it was extremely expensive and uneconomical.

Heat-Resisting Steels

DR. W. H. HATFIELD, Brown-Firth Research Laboratory, Sheffield, explained that the two-fold object of his researches on the foregoing subject was (a) the production of better heat-resisting steels, and (b) the obtaining of fundamental data to elucidate the nature of the attack from which steels suffer when exposed to the atmosphere and industrial gases at high temperatures.

The main feature of the paper is the attempt to establish quantitatively the fact that the added compounds, CO, and SO₂, produce steels which satisfactorily resist attack at high temperatures, and among such can safely be cited certain compositions in the chromium, the silicon-chromium, chromium-nickel, chromium-nickel-silicon, and chromium-nickel-tungsten series. Some of these steels have extremely satisfactory characteristics as regards resistance to corroding media under the conditions studied and are fitted for much wider service than that in which they are at present employed.

T. G. Elliott, Sheffield, said the paper would prove very interesting and most instructive to those who were commencing the study of heat-resisting steels, but to those who, like himself, had rather expected a more comprehensive treatment, there might be some disappointment. The subject of heat-resisting steel was not new. It was more than 20 years ago that in America there was patented a steel with chromium or cobalt for heat resistance rather than electrical resistance.

The tests described by Doctor Hatfield were typical of tests carried out in his own laboratory some years ago, and the majority of Doctor Hatfield's results were consistent with those he had obtained, but he was surprised by the effect of SO₂ on metallic nickel. He should therefore like to ask if that result had been checked. Since reading the paper he had had some strips cut from a thick nickel crucible and tested at 800 and 1000 deg. C., respectively, in two ways, in the first instance by passing SO₂ directly from the syphon over the heated nickel, and in the second place by drying the gases previously to passing them over the nickel. In both cases at 1000 deg. the absorption of sulphur and the increased weight was more than at 800 deg.

Effect of Impurities in Atmosphere

The paper was pointed to by Ulick Evans as of the greatest interest and importance. He was particularly

interested in the effect of small quantities of foreign impurities in the atmosphere in increasing corrosion. In connection with the difference between muffle atmosphere and ordinary products of combustion, he thought the difference might be attributed to the fact that the muffle atmosphere contained carbon monoxide, whereas the products of combustion contained considerable extra oxygen. He agreed that Doctor Hatfield had proved his point when he attributed important effects to the presence of sulphur dioxide. That was of considerable economic importance in view of the fact that the same cause, sulphur dioxide, increased low temperature corrosion also.

The mechanism was different in the two cases, he said. In low temperature corrosion, sulphur dioxide only acted if there was a considerable amount of moisture also present. He had kept steel in dry air containing sulphur dioxide for many weeks, and it still remained absolutely bright. In the presence of water there was a film of moisture on the metal, and corrosion took place very quickly, showing all the features of electrochemical action. There were little spots of intense corrosion surrounded by perfectly circular areas where the steel was absolutely bright.

Anything which would decrease the permeability of the scale would decrease the rate of attack and, no doubt, that was the reason for the influence of chromium on the steels in decreasing the attack at high temperatures. Anything that increased porosity would increase the rate of attack. Directly formed oxide scale would be relatively permeable. Oxide which produced decomposition to sulphite or sulphide would be relatively porous. In the presence of a small amount of sulphur dioxide there might be temporarily a certain small amount of sulphide or sulphate which would quickly decompose, leaving a relatively porous oxide. It was therefore possible to understand why, under such conditions, the thickening of the scale might go on at an increased rate. No doubt carbon dioxide would act in the same way.

Study of Thermo-Extensibility a Help

Col. N. T. Belaiew considered that the study of the heat resistance of materials and of heat-resisting steels was of particular importance now because, from the point of view of hydroplane technique, heat-resisting steels were a question of considerable importance. He thought the study of heat-resisting steels would be much helped by the application of the method of thermo-extensibility. He thought perhaps that method of extensibility, by showing that the extensibility of some of the chromium alloys, especially with the extensibility of some of the constituents, was rather different from the others, and might lead to the lines of work to which Mr. Evans had referred.

Silicon Content Aids Resistance

The most striking fact to Dr. Carl Benedicks was that a content of silicon gave a very high resistance against oxidation. That, of course, was quite conformable to what had been explained of late years, especially by Doctor Evans, namely, that the explanation was to be found in the fact of an oxygen-containing layer surrounding the metal. If that explanation was true it was rather astonishing to find that the very best result was obtained with chromium-nickel-tungsten steel in complex gases. In tungsten there might be expected to be such an oxidized layer of an essentially protecting nature, and he should like to ask Doctor Hatfield whether he did not think that the high silicon content of the test specimen was to a great extent responsible for the high resistance.

Chromium and Oxidizing Atmospheres

The president said there was one point in the paper which he should like to mention. Doctor Hatfield seemed to think that, in the presence of SO₂, nickel and tungsten steels were likely to be more protective than chromium alone. No doubt within the range of his experiments that was so; the results undoubtedly pointed in that direction, but in his own experience he knew of certain cases where there had been alloys of chromium alone working in an oxidizing atmosphere for months and months with good results.

Drop Forgers Hold Annual Meeting

Association Problems Discussed—Some Lines Along Which Hammer Builders and Users Might Cooperate Outlined

SEVEN addresses on a variety of subjects of interest to the drop forge industry, and a smoker, a banquet, and golf and other recreational features made up the program of the annual meeting of the American Drop Forging Institute, which was held at the French Lick Springs Hotel, French Lick, Ind., May 17, 18, and 19.

The necessity for active industry cooperation was the keynote of the first session of the meeting, which was opened with an address of welcome by C. W. Wright, president of the Institute and vice-president of the Steel Car Forge Co., Pittsburgh.

A convincing picture of the benefits of such cooperation was reflected from an address by Maurice Saunders, who outlined some of the comprehensive activities of the Lithographers' National Association, New York, of which he is the managing director. These activities include the establishment of uniform cost-finding methods, encouraging the adoption of group insurance and other projects which make for better employee relations, and the development of a simplification and standardization program. Technical research has been an outstanding cooperative activity, and support has been given to comprehensive apprenticeship and other educational programs. Industry advertising is one of many other activities.

"Researching" for Better Methods and New Markets Advocated

The fundamental role of cost work and the necessity for constant "researching" for better methods and new markets were major points of emphasis in an address by E. St. Elmo Lewis, counsellor for the National Services, Inc., Detroit. The title of his address was "Better Selling, Bigger Markets—Better Profits."

Cost systems were classified as of three kinds: The comfortable cost systems; those that permit of quoting a price to get the business, estimated costs; and costs that tell the truth. Accurate knowledge of cost and the getting of a fair profit were stressed by Mr. Lewis as the first two steps of sound business conduct.

Taking industry as a whole, one main fault, said Mr. Lewis, is the lack of market and similar research, the study of markets with a view to forecasting the probable trend being stressed as of primary importance. Active investigation into the possibility of extending the market for drop forgings was advocated, as well as industry publicity that would tend to increase the consumption of those products. The necessity for education within the industry, as well as outside of it, was emphasized, and also the need for "industry consciousness" on the part of members of the industry.

We are in a buyers' market in every line, said Mr. Lewis; the buyer is getting to be more and more the dominant factor. In the past two or three years "buymanship" has been overcoming salesmanship. Stronger competition within individual industries, and as between industries, in the next few years was predicted. Distribution is becoming the foremost problem, said Mr. Lewis. One method of reducing the cost of distribution was said to be in reducing the sales forces by consolidation. Over-capacity was briefly discussed, and among the remedies given for meeting "over-planting" in any particular industry was: The finding of new markets, finding of a new product, or the consolidation of plants.

Possibilities of Cooperation Between Hammer Builders and Users

AGREEMENT between the hammer manufacturers and drop forgers in the elimination of certain sizes of hammers was suggested as perhaps desirable, by Macdonald S. Reed, sales engineer, Erie Foundry Co.,

Erie, Pa., in a paper on "Cooperation Between Hammer Builders and Users."

"In the steam drop hammer field we might limit our figures to the hammers rated from 1000 to 20,000 lb. inclusive, since steam drop hammers smaller than 1000 lb. are being bought only infrequently," said Mr. Reed. "Some will probably believe that the lower limit might be set even higher, but the 1000-lb. size makes a convenient basis for figuring the series. Even if this is taken as No. 1 of the series, it is probable that there will have to be a sub-series of smaller sizes to meet the demands of some forgers. At present we have 16 steam drop hammer sizes from 1000 to 20,000 lb. inclusive. We believe that all forging requirements could be met with a smaller number of hammers."

It was thought that the present 16 sizes of steam drop hammers might be reduced to ten, in which series each hammer would be approximately 40 per cent larger than the preceding one. The series suggested by Mr. Reed was not offered as perhaps the best, but merely as an illustration of what might be done.

In reference to board drop hammers Mr. Reed said: "We now build 19 sizes, ranging from 200 to 6500 lb. In selecting a series, we may consider only the sizes most frequently used. We now build 12 sizes from 1000 to 5000 lb. inclusive. These might be reduced in number to eight sizes, of which each would be about 25 per cent greater than the preceding size."

Suggests Standardization of Die Notches

Another field of standardization, regarded by Mr. Reed as even of greater importance, is in the matter of die notches in rams and sow blocks of hammers, and also in trimming presses. On this he said: "I can see no apparent justification for the endless variety of notches which are now in use. The die notch has the same function to perform in every case, and considering any one size of hammer, we do not believe that there is enough difference in the dies used in the various shops to warrant any change in the die shank."

Sudden change to a new standard in the matter was not, however, advocated. It was indicated that a committee of the Institute might design four or five sizes of die notches, which should apply to the complete range of hammers, both steam drop and board drop. It was also indicated that it might take years to work into this, and that possibly some shops would never adopt it. "We have not considered what the effect of such a change might be on the interchangeability of dies between various shops," added Mr. Reed, "but it would seem that it might be of some advantage to the purchaser of forgings, and that it would not work any hardship on the forge shop."

Data relating to the maintenance cost of hammers would, it was indicated, be of help to hammer manufacturers. If more accurate cost data were available, the figures might indicate that the maintenance cost makes up the greatest percentage. In such a case the hammer builders might be justified in improving hammer construction even at a considerable increase of cost, since the decreased maintenance expense would more than offset the increased charges for interest, depreciation, etc. In the same connection, but in another part, Mr. Reed said, "We do not intend to imply that you have merely to make a request and we can tell you how to reduce your cost. We would like to know where your problems lie, so that we can work at the right thing. One of our difficulties is in determining whether the trouble which one shop is having is general in all shops, or whether it is peculiar to the one shop alone."

Practice in the bushing of cylinders, anvil design and foundations were among subjects which Mr. Reed thought might be discussed. It was suggested that there

might be a field for the Institute as a meeting place for shop superintendents or other operating executives. On this Mr. Reed said: "Certainly if one shop has shown ingenuity and resourcefulness in the design of dies, for instance, they are entitled to the benefit of their ideas and should not be expected to make it common property. But it is easy to see the distinction between this and the function which we have suggested for such a group in cooperating with the hammer builders."

"It should be possible to establish certain standards of performance for various types of hammers. . . . Such standards might include the speed of the hammer at some given steam pressure, say the number of full length strokes per minute and the maximum number of strokes per minute which can be obtained. You might establish some standard of steam consumption under fixed circumstances. There is a great difference in the steam consumption of hammers, between those with worn piston rings and cylinder bores, leaky valves and badly adjusted valve gearing, and hammers which are in good repair."

"There should be some method of measuring the force of the blow of the hammer, and standards should be established indicating what is to be expected of the various sizes of hammers."

Topics for Discussion In Board Drop Field

In the board drop field, topics suggested for discussion by a technical committee of drop forgers include boards; method of driving board hammers; and the unit pressure between rolls and board. Another question for investigation was said to be: "What are the maximum and minimum sizes in which it is economical to use the four-roll board drop hammer, rather than the steam drop, or rather than the two-roll hammer?" Still another question in connection with board hammers is that of stroke. On this Mr. Reed said, "As hammers are now built, it is possible to advance by very small increments from the minimum stroke to the maximum. Are these small steps necessary and are they an advantage? Or, if by so doing the hammer construction could be simplified, would it be just as satisfactory to have, say, three lengths of stroke, the minimum, maximum and one step between?"

In explaining why the hammer manufacturer and drop forger should cooperate, and in defining in a general way the field in which they can work together, Mr. Reed, in beginning his address, pointed out that for almost all matters of a practical operating nature, the hammer builder must depend upon the advice and constructive criticism of the men operating the shops. It was a pleasure, he said, to acknowledge indebtedness to them.

Forging Conditions In Europe

An address by Prof. J. H. Nelson of the Wyman-Gordon Co., Worcester, Mass., on "Forging Conditions in Europe" was also received with interest.

In Europe, as in America, the forging industry is closely associated with the transportation industries, said Professor Nelson. The automobile has not reached the stage of a common vehicle of transportation, it still being regarded as a luxury. Four-cylinder cars predominate, although the present tendency is toward six-cylinder cars. It was said that of 282 models of cars, 206, or 73 per cent, are of four-cylinder type; 62, or 22 per cent, of six-cylinder type and 14, or 5 per cent, are of eight-cylinder type.

European forge shops were said to be equipped largely with American hammers. The outlook for American participation in the European forging market was not considered very promising chiefly because of the comparatively low wages of the European workmen, and the high import duties. In the field of research, America, it was said, had something to learn from Europe. The large corps of research workers and the extensive laboratories of the Krupp works was cited as an example.

Material For Maintenance Parts Discussed

H. F. Wood, metallurgical engineer, Ingalls-Shepard division of the Wyman-Gordon Co., Harvey, Ill., in

an address under the title of "The Relation of Metallurgy to the Drop Forging Industry," advocated the use of the best material obtainable for the maintenance parts of drop hammers.

The industry as a whole knows too little about material for this use, he said, which material is a factor in the cost of operation because of the interruption to production caused by the failure of such maintenance parts. Proper design, such as the form of screw threads, was also stressed as important in preventing failures. Slides picturing piping and other defects in steel were shown, and failure of hammer parts caused by such defects were briefly discussed. Disposing of the question of defective material as being due to "crystallizing" of the material due to fatigue was, Mr. Wood indicated, a fallacy. The fact of the matter is, he said, that if a coarse crystalline fracture is found, the material probably was coarse-grained to start with. Specimens of steel having the proper structure for maintenance parts were also shown.

In the second part of his address Mr. Wood interestingly described and illustrated the automatic electric heat-treating equipment installed at the Ingalls-Shepard plant of his company. This equipment consists of two rotary hearth electric furnaces, one for hardening and one for drawing, with automatic charging and discharging devices, automatic quenching mechanism and transfer conveyors. The power input to the hardening furnace is 793 kw. and to the draw furnace, 720 kw., making a total of 1513 kw. connected load. The several advantages of this electric installation, regarded as one of the largest, were enumerated. Of outstanding importance is that by the elimination of direct labor, the human element in the heat-treating operation is minimized.

Paper Devoted to Personnel Problems

Another address was that of Joseph Thompson, manager of works, Steel Car Forge Co., Hammond, Ind., on the subject of "The Value of Non-Financial Incentives in the Forge Shop."

It was pointed out by Mr. Thompson that the problem of satisfying labor is not entirely one of more pay. Steady employment was said to be desired by every wage earner, as well as fairness in distribution of work and in promotion.

Relative to the interest that should be shown in employees, Mr. Thompson said: "Workers must not feel that the plant is directed altogether from a distance by people who have no first-hand knowledge of conditions in the shop, and who are not able to understand the workers' viewpoint." "Let us try," he said, in another part, "to get back somehow, not to the one-man organization, but to the essential points of it—which means the personal touch and character-building advantages of it."

Foremen, it was held, should be trained in the knowledge of costs, and helped in conveying this knowledge to the worker, in order that costs may be kept as low as possible.

A feature of the convention was the annual dinner, at which F. A. Ingalls, past president of the Institute and vice-president of the Wyman-Gordon Co., Harvey, Ill., presided. Following an interesting outline of conditions in China by Mr. Ingalls, Capt. Irving O'Hay, New York, delivered an unusually entertaining address relating to his adventures in several revolutions and wars. The chairman of the convention committee was C. H. Smith, president of the Steel Improvement & Forge Co., Cleveland.

Application of Ward-Leonard control to the hoist and trolley motions of an unusual ore bridge will be made by the Chile Exploration Co. at its plant in Chuquicamata, Chile. This ore bridge will be used to remove the crushed waste rock, known as "ripio" from the leaching vats after the copper has been extracted from the crushed ore by the leaching process. The ore bridge will be supplied by the Wellman-Seaver-Morgan Co., and is to be equipped with General Electric motors and control.

CLASH ON RATES IMPENDS

Ohio Decision on Pig Iron Rates Expected to Result in Action Under Thirteenth Section

WASHINGTON, May 24.—The refusal of the Public Utilities Commission of Ohio to permit increases in rates on pig iron in Ohio leads to the belief that the railroads will proceed before the Interstate Commerce Commission under the so-called thirteenth section of the commerce act on the ground that the maintenance of the present Ohio intrastate rates will set up unjust discrimination in interstate commerce. Under the recent decision of the Federal commission there was a general readjustment made of pig iron rates in Central territory, some of them purely intrastate in character, and it is thought that the railroads will contend that if the latter are changed there will be a disturbance of the interstate rate relationship.

The action of the Ohio commission adds another to the many complications that have characterized the whole case. Not only were there differences of view among shippers, consumers, traffic associations and others, but originally the railroads themselves were not in accord, and this was particularly true of the Ohio rate situation. The decision of the Federal commission was based on a so-called compromise which the railroads endeavored to work out. The Federal commission conceded that the proposed adjustment, which was approved to become effective May 30, is not all that might be desired. It added, however, that it is an improvement over that now existing. It denied certain proposed adjustments, including a rate of \$2.15 per gross ton from the Chicago district to St. Joseph, Benton Harbor, and Bridgman, Mich.; a rate of \$2.40 from the Chicago district to Goshen, North Manchester, Huntington and Wabash, Ind., and a rate of \$2.90 from Toledo, Ohio, to Logansport, Ind.

From the outset different State commissions entered the proceedings. The Public Utilities Commission of Ohio and the Public Service Commission of Indiana protested against increased intrastate rates in the common-

wealths they represented, although they permitted decreased rates to become effective. At the request of the Ohio and Indiana commissions a joint hearing by these commissions and the Interstate Commerce Commission was held in December, 1926, at which evidence was received concerning both State and interstate traffic. Representatives of the Public Service Commission of Pennsylvania and the Michigan Public Utilities Commission also sat at the joint hearing, but the intrastate proceedings in these States were not heard jointly with the Federal commission docket and the latter in its decision said the intrastate rates in those two States were not directly involved in the general proceeding. The railroads admitted that the rates they had proposed were generally higher for like distances than the rates in Illinois territory, but they argued that the Illinois rates are on a depressed basis because of acute competition between carriers and unusual pressure from shippers and consignees. A committee composed of Central, Illinois and Western Trunk Line carriers is considering a revision of rates in Illinois territory with a view to aligning these rates with the rates in Central and Western Trunk Line territories.

The Federal commission plainly intended that the State commissions might among themselves iron out differences, but further than that it is likely the Federal commission also saw that the question of intrastate and interstate rate relationships might come back to it for settlement. At some length it recites other rates, both within States and between States, and makes comparisons which showed that many relationships there were out of line. It is held to be probable that the carriers will emphasize this condition and endeavor to show that the refusal of the Ohio commission to allow higher rates to become effective will lead to confusion and inequitable adjustment of rates.

(Rates effective May 30, as prescribed in the Interstate Commerce Commission's recent decision, are given below for Indiana and Michigan. The effective date of the proposed rates in Ohio is thrown in doubt by the action of the Ohio commission.)

Pig Iron Rates Effective May 30 and Present Rates

(Per Gross Ton)

INDIANA

To	Chicago		Toledo		Columbus		Ironton		Granite City		Cleveland	
	New	Present	New	Present	New	Present	New	Present	New	Present	New	Present
Anderson	\$2.65	\$2.65	\$2.65	\$2.65	\$2.65	\$2.65	\$2.90	\$2.90	\$3.40	\$3.42	\$3.15	\$3.15
Bremen	2.05	1.89	2.65	2.65	3.40	4.03	3.70	4.54	...	...	3.40	3.28
Connersville	3.15	3.15	2.90	2.90	2.50	2.65	3.15	2.90	3.40	3.42	3.15	2.90
Elkhart	2.25	2.27	2.50	2.65	3.25	4.28	3.25	3.15	3.65	3.69	3.25	3.15
Evansville	3.15	3.15	4.79	4.79	4.79	4.79	4.79	4.79	2.65	2.65	5.50	5.50
Fort Wayne	2.40	2.65	2.00	2.27	2.65	3.02	2.90	2.90	3.65	3.69	2.90	2.90
Indianapolis	2.65	2.65	2.00	2.02	2.65	2.65	3.30	3.15	2.90	2.90	3.30	3.15
Kokomo	2.65	2.65	2.65	2.65	2.65	2.65	3.30	3.15	3.40	3.42	3.30	3.15
La Porte	1.85	1.76	2.90	2.65	3.90	4.15	3.90	3.28	...	...	3.90	3.28
Michigan City	1.40	1.39	3.00	3.15	3.90	4.00	4.20	4.79	...	...	3.15	3.28
Marion	2.65	2.65	2.65	2.65	2.65	2.65	2.90	2.90	...	...	3.40	3.28
Mishawaka	2.05	1.89	2.65	2.65	3.40	4.03	3.70	4.29	...	...	3.15	3.28
Muncie	2.65	2.65	2.65	2.65	2.65	2.65	2.90	2.90	...	...	3.15	3.28
Richmond	3.15	3.15	2.65	2.65	2.50	2.52	2.90	2.90	...	...	3.40	3.28
South Bend	2.05	1.89	2.65	2.65	3.40	4.03	3.70	4.29	3.65	3.69	3.40	3.28
Terre Haute	2.65	2.37	3.50	3.65	3.53	3.53	3.65	3.65	2.65	2.65	4.41	3.53

MICHIGAN

To	Chicago		Detroit		Toledo		Cleveland		Columbus	
	New	Present	New	Present	New	Present	New	Present	New	Present
Battle Creek	\$3.00	\$3.02	\$2.40	\$2.65	\$2.40	\$2.50	\$3.50	\$3.28	\$3.50	\$4.28
Benton Harbor	1.89	1.89	3.00	2.90	2.90	3.15	3.90	3.53	3.90	4.41
Cadillac	3.90	4.80	3.05	3.15	3.15	3.15	4.15	5.10	4.15	5.17
Detroit	3.15	3.15	...	...	1.40	1.39	3.00	3.02	3.00	3.02
Dowagiac	2.25	2.65	2.90	2.90	2.90	2.90	3.75	3.53	3.75	4.28
Flint	3.25	3.15	1.90	1.89	2.10	2.02	3.35	4.28	3.35	4.28
Grand Haven	3.00	3.02	3.00	3.02	3.10	3.02	4.00	4.41	4.00	4.41
Grand Rapids	3.00	3.02	2.90	2.90	2.90	2.90	3.90	4.41	3.90	4.41
Holland	2.90	2.90	2.90	2.90	3.00	2.90	4.00	4.41	4.00	4.41
Jackson	3.05	3.02	1.90	1.76	1.90	1.76	3.15	3.65	3.15	3.65
Kalamazoo	2.65	2.65	2.65	2.90	2.65	2.90	3.50	3.53	3.50	4.28
Lansing	3.15	3.15	1.95	2.02	2.10	2.02	3.35	4.28	3.35	4.28
Muskegon	3.00	3.02	3.00	3.15	3.10	3.15	4.02	4.41	4.00	4.41
Niles	2.05	1.89	2.90	2.65	2.65	2.65	3.75	3.28	3.75	4.05
Pontiac	3.15	3.15	1.40	1.76	1.90	1.76	3.15	4.28	3.15	4.28
Port Huron	3.50	3.15	1.75	2.52	2.20	2.52	3.40	4.28	3.40	4.28
Saginaw	3.25	3.15	2.10	2.52	2.40	2.52	3.50	4.41	3.50	4.41
St. Joseph	1.89	1.89	3.00	2.90	2.90	2.90	3.90	3.53	3.90	4.16

Steel Treaters Meet at Milwaukee

Spring Sectional Meeting Reviews Problems in Treatment of High-Speed Steel, Strong Aluminum Alloys, Carburizing and Welding

MEASURED by the yardsticks of technical discussion, attendance and interest, there was no doubt in the minds of those present as to the success of the spring sectional meeting of the American Society for Steel Treating, held at Milwaukee May 19 and 20. That Wisconsin city is the home of J. Fletcher Harper, president of the society, and it was the Milwaukee chapter of which he is a member that so creditably acted as host to the guests.

Technical papers covered many subjects, including heat treatment of wrought aluminum alloys and high-speed steel, and carburization of steels. A paper on the processing of welding wire disclosed much valuable research work in which the electric arc was studied by the use of the moving picture camera fitted with negatives, sensitive to infra-red light rays. Following the banquet on Thursday evening, the trend of human thought in the natural sciences was traced from the early Greeks up to the present time. The curve of development was shown to be ascending and so gave, in some measure, an insight into scientific thought and progress of the future.

Registration at the meeting was close to 300. Two afternoons were given over to visits to many prominent manufacturing plants.

Six Technical Papers Cover Variety of Problems

AT the three technical sessions, six papers were presented which embraced the discussion of a wide variety of ferrous and non-ferrous heat treatment problems. Abstracts of these follow with some of the discussion which in some cases was cut short due to lack of time.

Scientific Research and Industry

AT the opening technical session T. McLean Jasper, director of research A. O. Smith Corporation, Milwaukee, read a paper on "Scientific Research and Its Application to Industry." This was followed by a paper on "The Automatic Electric Furnace—Its Uses and Possibilities" by Harold F. Wood, chief metallurgist, Ingalls-Shepard Division, Wyman-Gordon Co., Harvey, Ill.

The perusal of work done by previous investigators and even, in some instances, the repetition of research work, was suggested by Mr. Jasper as aids to establishing a proper background for his successful termination of true research as distinguished from ordinary tests. A brief abstract of Mr. Jasper's paper follows:

Often undesired results in the application of research are brought about by the fact that it is attempted before the work of the laboratory, or before study is sufficiently completed to draw a sane and unbiased conclusion. Sometimes the cause of unsuccessful application of research is the result of biased data on which unsound conclusions have been drawn:

The production of scientific research is occasionally confused with the making of tests. Research involves much more than the making of tests. It involves the logical design of experiments which, when completed, will give a "yes" or "no" answer to a definite question. It involves:

- 1.—Research leading to new discoveries.
- 2.—Research leading to new and more economical methods of producing old products.
- 3.—Researches tending to supplement and improve old processes and products.

Of the three divisions outlined above, the first generally requires a higher degree of skill and application than the other two because less precedent is available on which dependence can be put for help. In the other two divisions the skill required in general decreases in the order named.

Work of Other Investigators Must Be Studied

Too much stress cannot be placed on going through, as a preliminary, the work of other reliable investigators on similar or analogous problems. Such publications as

the proceedings of the Royal Society, the various national academies of science and the proceedings of professional societies, and such publications as the *Philosophical Magazine* and other technical papers and magazines, are particularly helpful, most of which are readily available in the various libraries in this country. The result of this preliminary study (which relatively few research workers are willing to carry through) creates an atmosphere which is congenial to developing a sense of feel and a sense of proportion for the thing in mind.

Assuming for the moment that the problem has been successfully solved, the next thing to do is to present the work in such a manner that it will be readily understood by those who can best use it. Too few workers engaged upon research realize the importance of this essential. In order that the results of successful investigation can be used in industry it frequently involves handing it over to an entirely separate organization for its successful application.

There are three general underlying important points which need to be considered in the question of applying changes to manufacturing processes, i. e.,

- 1.—A consideration of its effect on the existing economic situation.
- 2.—A consideration of its cost.
- 3.—A consideration of its application with the class of workers which are involved in the change.

To draw attention to these factors may seem unnecessary to many, yet the fact remains that the lack of a full consideration of them has resulted repeatedly in lack of success and the unremunerative expenditure of much money. Case after case can be cited in which the above statements stand verified.

During the discussion of this paper, Dr. Zay Jeffries, consulting metallurgist, Aluminum Co. of America, pointed out that all active industry feels the need of providing for the future. The past has taken care of itself and cannot now be corrected. In some measure actions today are based upon the past, but no manufacturer can afford not to direct his attention toward the future. The principal assets of any organization, he said, are brains and information, and not real estate or buildings, which can readily be replaced. One of the major problems of the existing manufacturing plant is to keep the total investment down below the capital expenditure necessary for a new competitor to start in business and force a division of the market. To accomplish this it is necessary that research and technical work be focused on the problem.

In answer to a question as to the relative merits of university and industrial research, Mr. Jasper expressed

the opinion that research often centers around personality rather than any particular location. There are cases where admirable work can be done in the university laboratory, and on the other hand, some problems are more satisfactorily solved under factory conditions. There are many instances when research is successfully carried out in the shop.

Automatic Heat Treatment of Crankshafts

FURNACES designed for the automatic heat treatment of automotive crank shafts were described in Mr. Wood's paper. Advantages of this equipment are:

- (1) Proper location of the heat-treating operations with respect to other production operations, thereby making the furnace set the pace for preceding and subsequent operations;
- (2) Individual handling of product with resultant exact duplication of treatment on each part;
- (3) Elimination of direct labor and centering responsibility on one man;
- (4) Maximum possible net thermal efficiency;
- (5) Maximum production per unit of floor space;
- (6) Flexibility in heat treatment of a variety of design of parts; and
- (7) Rugged construction with no parts of conveying mechanism subjected to heat.

Rotary Electric Furnace

In brief, this equipment consists of two rotary hearth electric furnaces, one used for hardening and the other for drawing, with automatic charging and discharging devices, automatic quenching mechanism and transfer



T. M. JASPER



H. B. NORTHROP

conveyors. The hearth is built of structural steel with railroad rails running on drop forged and heat-treated rollers. The hearth is driven by a 3-hp. motor through a simple pawl and ratchet. The furnace lining consists of 9 in. of fire brick backed with 12½ in. of insulation.

A motor driving the charging and discharging mechanism is mounted on top of each furnace. The forging is discharged from the hardening furnace upon the quenching mechanism. The final 2 in. of stroke of the discharge pusher head trips the quenching mechanism and the forging is submerged and placed on a variable speed conveyor for transfer to the draw furnace charging trough. Just before the forging reaches this trough it strikes a paddle that sets the draw furnace cycle in operation. The forging is discharged from the draw furnace to a duplicate of the quenching mechanism and is delivered by a conveyor to the next operation after heat treatment. The charging and discharging mechanisms, hearth drives and quench tank, are interlocked electrically to assure proper sequence of operations. In this way it is impossible for the charging and discharging mechanisms to function while the hearths are in motion, or out of proper index when stationary.

Each furnace is divided electrically into six zones, the kilowatt input per zone being as follows:

Zone No.	Hardening Furnace, Kw.	Draw Furnace, Kw.
1	151	120
2	141	120
3	141	120
4	120	120
5	120	120
6	120	120

The maximum power input to the hardening furnace is 793 kw., and to the draw furnace 720 kw., making a total of 1513 kw. connected load. However, each zone is separately controlled and the maximum demand does not exceed 1000 kw.

The following table shows operating and net thermal efficiencies over a period of three months:

Month	Operating Efficiency, Per Cent	Net Thermal Efficiency, Per Cent
February, 1927.....	96.2	66.9
March, 1927.....	96.7	70.8
April, 1927.....	96.87	67.4
Average.....	96.59	68.40

These figures include all radiation, transformer and standby losses. The operating efficiency was calculated on the basis of actual producing cycles to total possible cycles. No direct labor was performed during the three-month period.

Data on Heat Treatment of Aluminum Alloys

HEAT treatment both of ferrous and non-ferrous metals was the subject of an entire session. The first paper was read by R. S. Archer, research bureau, Aluminum Co. of America, Cleveland, on "Heat Treatment of Wrought Aluminum Alloys of High Strength." The information contained therein will become the first of the data sheets on non-ferrous metals. These data will be published by the American Society for Steel Treating in cooperation with the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers.

This paper was presented as the work of Mr. Archer, chairman of a sub-committee, assisted by H. C. Knerr, consulting metallurgist, United States Naval Aircraft Factory, Philadelphia, and H. S. Rawdon, metallurgical division, United States Bureau of Standards, Washington. A brief outline of the paper follows:

Special Aluminum Alloys Investigated

The alloys discussed included duralumin, manufactured in the United States by the Bausch Machine Tool Co., and 17S, 25S and 51S produced by the Aluminum Co. of America.

Duralumin and 17S are supplied in several grades differing in chemical composition but all containing both copper and magnesium. Special 17S also contains added silicon and 25S contains copper, manganese and added silicon but no magnesium, while 51S contains magnesium and silicon with copper present only as an impurity. In the heat-treated condition, tensile strength varies from 30,000 to 70,000 lb. per sq. in. and elongations from 8 to 30 per cent.

The heat treatment processes normally applied to these alloys are of three types:

- Annealing: Normally applied to work-hardened metal to soften and improve workability.
- Solution heat treatment: A treatment at 910 to 985 deg. Fahr., depending on the alloy, followed by quenching. This brings the soluble constituents into solution, improving the properties of the alloys and producing susceptibility to hardening by natural or "artificial" aging.
- Precipitation heat treatment: A treatment at elevated temperatures, usually from 250 to 320 deg. Fahr. to produce age-hardening, which is considered to be due to the formation of a fine precipitate.

Work-hardened material is annealed at about 650 deg. Fahr. and cooled to below 500 deg. Fahr. Alloys previously hardened by the solution heat treatment with or without a subsequent precipitation treatment are not completely softened by this treatment. In such cases it has been found effective to heat an hour or more at 800 deg. Fahr. and to cool very slowly to below 500 deg. Fahr.

The precipitation treatment is normally applied only to special 17S, 25S and 51S. Special 17S and 51S also age-harden to a marked extent at room temperature but the hardness is further increased by aging at elevated temperatures.

Care Must be Taken to Avoid "Burning" the Alloy

Accurate temperature control is required, especially for the solution heat treatment. If the temperature is too low, hardening will be incomplete, while if it is too high, the alloys will be "burned."

Temperature for Solution Heat Treatment			
Alloy	Permissible Range Deg. Fahr.	Preferred Temperature, Deg. Fahr.	
Duralumin, 17S, A-17S, B-17S	925-960	950	
25S and 51S.....	950-985	970	
Special 17S.....	910-930	925	



R. M. SANDBERG



R. S. ARCHER



J. B. GREEN



H. F. WOOD

The discussion of this paper was led by A. H. d'Arcambal, consulting metallurgist, Pratt & Whitney Co., Hartford, Conn., and A. Rauch, chief inspector, Cutler-Hammer Co., Milwaukee. The principal points stressed were that welding wrought aluminum alloys is not an easy task and that it destroys the characteristics of the metal at the point of weld. Aging was said to be comparable to secondary hardening of high-speed steel. The deflection of these alloys, as compared with steel, is approximately 3 to 1, the modulus of elasticity for the aluminum alloy was said to be 10,000,000 lb. per sq. in. as compared with 30,000,000 lb. per sq. in. for steel. The endurance limit of aluminum is 15,000 cycles as compared to 90,000 for steel and the safe working stress often used in calculating the column of an aluminum piston rod is 10,000 lb. It was also brought out that the elastic modulus of the alloy is not affected by heat treatment.

Theory and Practice in Heat Treatment of High-Speed Steel

THE second paper, the title of which was "Application of Theory to Practice in Heat Treatment of High-Speed Steel" was presented by K. M. Sandberg, assistant manager Columbia Tool Steel Co., Chicago Heights, Ill.

He reviewed the history of high-speed steel and then warned his hearers against taking too optimistic an attitude toward expecting big changes in the nature of new inventions in steel. He believes that what is actually needed is greater uniformity in tools. He outlined the various steps necessary in hardening high-speed steels and touched on the relative merits of various fuels. Other important points in this paper follow:

It is customary to preheat high-speed steel to 1550 deg. Fahr. or 1650 deg. Fahr., or possibly a little higher. The high heat furnace should be large enough so that the temperature will not drop more than 50 deg. Fahr. when new pieces are placed in it. Hardening temperatures should reach 2350 to 2450 deg. Fahr. and they should be under control by the use of accurate temperature measuring instruments. The temperature range recommended for quenching oil was 100 deg. Fahr. to 150 deg. Fahr. and the reheating temperature should be about 1100 deg. Fahr. A warning was issued that neither the steel maker nor the tool hardener should carry the entire burden of success or failure of a tool because shape, speed and feeds have much to do with the problem.

In the discussion of this paper Mr. D'Arcambal said that a double preheating offered the advantages of making the first furnace a stock furnace and it was necessary then to hold the steel only a short time in the second preheat. It was also brought out that duplication of results at the second reheat can be had if the tool is first properly annealed.

A question relating to physical properties of tool steel led to the information that the tensile strength is usually about 250,000 lb. per sq. in. at 63 Rockwell. It was accepted by some that charcoal used as a pack resulted in varying degrees of carburization. Hard wood charcoal and soft wood charcoal were said to give dif-

ferent results, some absorbing more oxygen than others, thus at times leading to combustion of the charcoal with resulting overheating of the steel.

Case Carburization in Salt Baths

"CASE Carburization of Steels by Means of Salt Baths of Low Cyanide Concentration," was the subject of an interesting paper by H. B. Northrup, J. W. Kelley Co., Cleveland. He pointed out that tests up to 1650 deg. Fahr. on a number of samples showed that the steels did not absorb carbon from the bath at equal rates. The appearance of density of carburized sections appeared to be almost an inverse ratio of the carbon absorption rapidity. The conclusions reached in this paper were as follows:

The majority of cyanide baths in production operation operate at temperatures under 1500 deg. Fahr. The resultant case from such cyaniding operations carries considerable iron nitride. Also in such cases the cyanide concentrations are what they may happen to be at any one time. A cyanide bath of known analysis, approximately 23 per cent NaCN, that is maintained at this concentration by frequent and regular additions of concentrated lump sodium cyanide affords definite information as to the depth and character of case produced when the bath is maintained at 1650 deg. Fahr. Steels tested were those ordinarily used in case carburizing and the following results were obtained:

Steel	Max. Carbon, Per Cent	Time, Hr.
S.A.E. 1120.....	0.628	3
S.A.E. 2315.....	0.565	4
S.A.E. 3115.....	0.620	3

Additional time only served to increase depth of case and, up to six-hour immersion, the exterior layers of the steel analyzed as above for the periods of immersion given. No nitrides were observed and the steels were free from brittleness.

The subject of salt pots was discussed with the somewhat general attitude having been taken that pots made of alloyed metals would in the long run give the most satisfactory service both as to cost and as to life.

Welding Wire and Effect of Flow of Welding Metal

TRANSFER of metals, both by means of the gas flame and the electric arc, was interestingly covered in a paper on "Processing Welding Wire and Its Effect on the Flow of Welding Metal," by J. B. Green, research department, Chicago Steel & Wire Co., Chicago. Welding flames and arcs were illustrated by lantern slides and moving pictures. A brief outline of that paper follows:

Some years ago the welding fraternity generally accepted the idea that an iron or steel filler rod was valuable in proportion to its chemical purity. As time went on, it became increasingly evident that something else had a bearing on filler rod quality. The research laboratories of the Chicago Steel & Wire Co. finally reduced the matter to four fundamental considerations. They discovered that filler rod quality was influenced by (1) chemical composition of the rod, (2) physical

structure of the rod, (3) chemical composition of the surface materials and (4) structure of the surface materials. The control of these fundamentals by the manufacturer so that the finished filler rod will possess the desired qualities is what is meant by "welding processed."

The quality of a welding rod is the composite of really a large number of items. Among such items is the flow of welding metal, although this in all cases is not necessarily the most important. As a rule, the molten metal during welding flows too fast to be studied and also emits such intense light that it is practically impossible to make direct observations. Slow motion picture photography is a logical way to investigate the subject.

Invisible infra-red light is the only light which will penetrate the haze and ordinary photographic plates and films are not sensitive to red light, much less infra-red rays. The research department of the Eastman Kodak Co. finally developed a special film which proved to be sensitive to infra-red light and pictures of welding which show the flow of metal became possible.

Series of welding rods were prepared in such a way that but one of the four fundamentals was varied at a time and the flowing welding metal was then photographed. This brought out a number of facts. It showed among other things the mechanism of metal transfer in the metallic arc and seems to have proved conclusively that most of the metal passes across by capillary attraction. It brought out the fact that there are apparently four types of arc which may be designated as (1) the steady core type, in which the arc pulls off the center of the molten drop; (2) the erratic core type in which the arc evades the center and pulls off only from the upper rim of the molten drop; (3) the saturated arc which flows in a stream, the cross section of which is equal to the diameter of the welding rod, and (4) the sheath type arc which very closely resembles the saturated arc in appearance except that it seems to have a hollow center.

Much more has been known regarding oxy-acetylene welding than metallic arc because the light intensity is nowhere near as great and the metal is subject to control by the operator. The motion pictures, however, seem to have developed an abundance of new facts

because incandescent non-metallic materials apparently emit infra-red light while metal surfaces do not. Somewhat the reverse seems to be true as regards visible light. Therefore, the pictures taken with infra-red light have permitted an intensive study of the effect on metal flow of solid non-metallics in connection with oxy-acetylene welding. There are a number of solid non-metallics quite commonly present in most all steel and their appearance when photographed with infra-red light seems to be sufficiently characteristic for each one of the solid non-metallics to permit their identification.

The Banquet Interesting

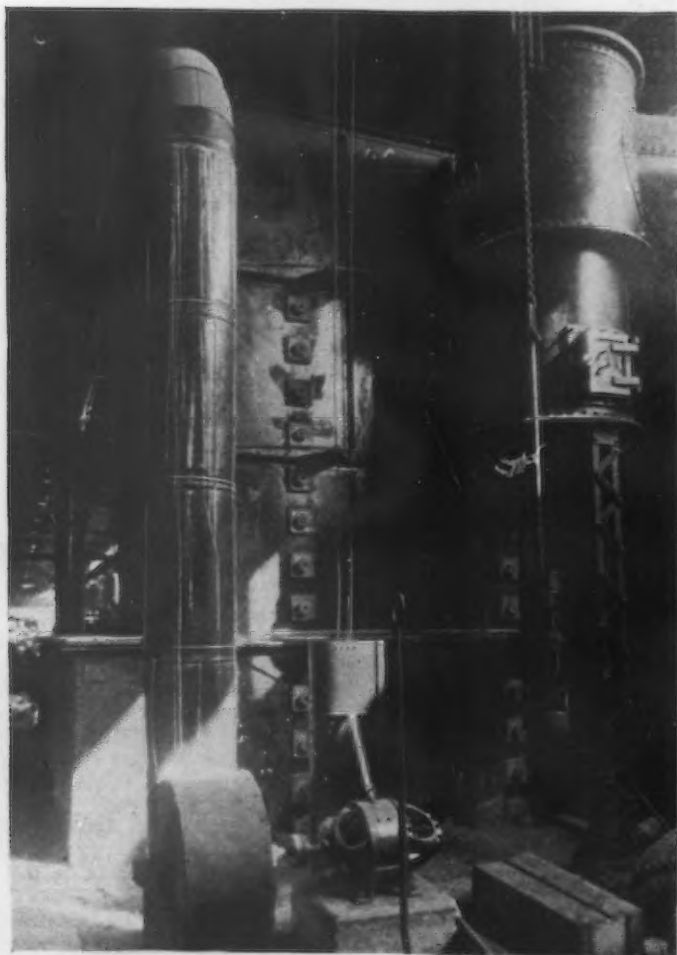
THE banquet, attended by 250, and the entertainment that followed, brought the first day of the meeting to a successful close. S. M. Havens, general manager, Ingalls-Shepard division, Wyman-Gordon Co., Harvey, Ill., spoke on "The Technical Organization in Industry." Dr. Max Mason, president, University of Chicago, in speaking on "Formalism and the Deeper Insight" pictured man as a curious combination of intelligence and foolishness and asserted that it is an open question where all our technical skill is leading us.

"Colleges must train for action and participation, but their primary function is to develop a long range vision—to train for definite deeper understanding and insight," he said.

"People have seen the practical value of science in the development of electricity and the radio," he pointed out, "and there now exists a universal appreciation of true science and universal approbation for organized curiosity, which is what scientific research is."

"This is reflected in our national advertising," he said. "Every other advertisement nowadays contains some assurance that the article described has been scientifically tested. Usually there is a picture of a man in an apron with a test tube."

"The test tube is not the unfailing mark of science, however. Science is an attitude of mind, and it is possible to be as scientific with a sledge-hammer as with a microscope."



THE recuperator shown in the illustration was built by the George J. Hagan Co., Pittsburgh, for use in connection with the heating furnaces installed at the plant of the Lukens Steel Co., Coatesville, Pa., for serving its new 84-in. tandem plate mill, described on page 1431 of *THE IRON AGE* of May 19. The recuperators are placed above the floor level with the waste gases introduced at the bottom and discharged to the stack at the top. A small fan blower delivers air to the top of the recuperator; it travels down and through ducts to the hearth and then flows through flues below the floor line to the base of the furnace, where it is admitted to the furnace at the firing end. The waste gases of each furnace are pulled out opposite the firing end and are carried in ducts just below the floor to the recuperators, where they are circulated through the recuperator, thence to the stack. Provisions are made for complete control of heating conditions by the operator.

Costs, Sales Policy and Engineering

Discussion of Machine Tool Builders Considers Also Engineering Museum, Saturation Point in Automobiles, Etc.

MOST of the matters taken up by the National Machine Tool Builders' Association, at its West Point meeting on May 10, 11 and 12 at the Hotel Thayer, were reported in *THE IRON AGE* of May 19. In the following paragraphs some of the closing discussion is covered, including a number of topics which evoked great interest among members present.

Museum of Peaceful Arts

Report upon the Museum of the Peaceful Arts recently established, largely through the bequest of the late Henry R. Towne, and on the Museum of Engineering and Industry was made by Sidney A. Keller, treasurer Keller Mechanical Engineering Corporation, Brooklyn, and chairman of the museum committee. It is the plan to fashion the engineering museum largely upon the one in Munich, Germany. The Munich museum is upon land furnished by the Government. So intense was the feeling that such a museum would be of great benefit to German industry that about 60 per cent of the materials going into construction was furnished by the various industrial plants. Even the laboring men entered into the spirit of the situation, giving much of the labor without charge, by working on Saturday afternoons and holidays. They made this sacrifice of their spare time for the future benefit of their children.

Not only in Munich, but in London and Paris, educational courses are carried on in connection with the industrial museums. In Paris there are more than 20 such vocational courses.

Central Museum to Be in Washington

The new building, an elevation of which was shown to the meeting, is planned to have a floor area of 6 acres, or double that at Munich. The cost is estimated at \$2,500,000. This central museum is to be located in Washington and is planned for eventual expansion to a total of 27 acres of floor space. Branches to be located in all important industrial centers are to be endowed and maintained locally.

Original exhibits, whether in the central museum, where most of them would be, or in the branches, would have replicas located in the other buildings in so far as these may be called for. If replicas prove too expensive, comprehensive photographic reproductions would be used. As replicas might be required in considerable numbers, it is planned to make eight or ten at a time, rather than a single one, for such a number could be produced at about half the unit cost of making one at a time.

A strong plea was made for preserving historic specimens of tools and other equipment coming to the notice of members of the association, so that these early types might become a part of the museum exhibit as soon as facilities are available to care for them. It is only by gathering such antiquated specimens, wherever they may be found, that the complete history of the machine tool industry can be written in the most usable form.

Consideration of Standards

Selection of the subject to be standardized and then establishment of a method of procedure were emphasized in the report of the standards committee, chairman of which is A. L. Stewart, Gleason Works, Rochester. He pointed out that there are three classes of materials subject to standardization:

- 1.—Materials of interest also to other industries. As an example, motor drives were mentioned. In such cases, cooperation with the other industries is essential.
- 2.—Subjects of interest to all machine tool builders, but not to outside concerns. As an example was mentioned the question of painting of tool frames or parts, both as to color and otherwise.

3.—Standardization by smaller groups. As an example was mentioned the recent standardized spindle arrangement of the milling machine group.

Cooperation with the American Engineering Standards Committee is important. Subjects which the committee recommended be taken up included pulley or driving shaft speeds, bushings, painting of machine tools, particularly as to color, and a uniform practice and nomenclature in the rating of machine tool capacities. The committee requested suggestions from members for further activity along these lines.

Saturation Point in Automobiles

Studies of the saturation points in automobiles were discussed by Mr. DuBrul. As the automobile industry is the biggest single customer of the machine tool industry, these studies mean a great deal to members of the association. Although the production of automobiles has been increasing year by year, the rate or percentage of increase has been dropping off steadily. A new life table of mortality has been prepared on the basis of studies in the Department of Economics in the University of Michigan. This indicates an average life of 7½ years and puts the saturation point at 1932, when there will be 18,000,000 passenger cars on the streets. At that time new production will be required practically to fill in replacements, with very few new owners developing.

Against this, another study places the saturation year at 1938, when there will be 25,000,000 cars on the streets. Replacements at that time will call for 5,000,000 cars per year, based on a five-year average life.

Jigs, Fixtures and Engineering

Jigs and fixtures came in for attention, it being pointed out that these sometimes equal or exceed the cost of the machine on which they are to be used. If, as is sometimes done, these are sold at cost in the effort to make a sale of the machine, this means that the manufacturer is selling half of his product without profit. It was recommended that sale of jigs and fixtures should be on a thoroughly business basis, with all costs added in and a fair profit added.

Buyers often send out to possible other bidders drawings submitted by early bidders for given equipment. These drawings usually represent considerable cost for engineering and other work. It was suggested that they can be copyrighted, which can be done for a fee of \$2. Where design is involved, a design patent can be obtained. While it would have only a limited life, this would last long enough in most cases, because rapidly changing conditions would in a few years make a new design necessary.

Where jigs and fixtures have patentable invention involved, patents may be applied for and that fact stamped upon both the drawing and the concrete thing. This would form an effective safeguard against competitors being shown the design and bidding on that basis.

Engineering Costs and Depreciation

Cost of the additional engineering work required by frequent redesign of machines was discussed by S. O. Livingston, first vice-president Gallmeyer & Livingston Co., Grand Rapids, Mich. Inasmuch as this cost is a continuous performance, as new designs are worked out year by year, the suggestion was made that it be not distributed over a period of years, but go into current costs for the machines. This seemed to be the consensus of opinion of those present.

Depreciation studies of the Department of Manufactures of the United States Chamber of Commerce were referred to. These are being made in conjunction with the depreciation work of the Bureau of Internal

Revenue. Information may be obtained, by those desiring it, from the Chamber of Commerce and typical rates may be had. A motion to have a committee appointed to study this subject was adopted.

Single Bid Policy

President Gleason brought up the matter of making a bid and sticking to it. The question was raised whether the life of a quotation is 15 days or longer. It was stated that in some large organizations, where much red tape is necessary before an order can be placed, quotations have to be alive for 30 or 60 or in some cases even 90 days. A standard form for quoting was strongly recommended, particularly as regards the perfunctory portion of a quotation.

Discounts for quantity are not allowed by most of the members, it was brought out when this topic was discussed. One member reported bidding on 12 identical machines aggregating about \$75,000. The purchaser asked for a 5 per cent discount because of the large quantity, the lower cost of production and the low sales expense. This was not granted.

One practice was discussed, in which quantity discounts are demanded, based on the total business of a year, which business may be divided among several or all of the plants of a corporation. In this case, however, the advantages of quantity production are lost to the machine tool builders, because the orders of the different units are not placed simultaneously, and production has to proceed on separate orders.

April Exports Higher Than March; Imports Lower

Heavy Outgoing Movement of Scrap But Much Reduced Shipments of Tin Plate—Beams Lead in Imports

WASHINGTON, May 24.—Exports of iron and steel from the United States in April totaled 192,339 tons, compared with 171,094 tons in March, a gain of 21,245 tons, while imports in April amounted to 60,374 tons, against 61,872 tons in March, a decrease of 1,498 tons, according to figures compiled by the Iron and Steel Division, Department of Commerce, which has not yet completed all the detailed data.

One of the big gains in exports in April was made in scrap, with a total of 24,393 tons, of which 12,073 tons went to Canada. Scrap exports in March amounted to 15,416 tons. There was a sharp drop in exports of tin plate in April, with a total of 18,159 tons, compared with exports in March of 26,817 tons. Of the April exports of tin plate, 11,011 tons went to Canada.

Tonnages of Specific Shipments

Pig iron exports totaled 3753 tons; steel bars, 9209 tons, of which 5827 tons went to Canada; alloy steel bars, 445 tons; iron bars, 365 tons; boiler plates, 2923 tons; other plates, 12,031 tons, of which 11,548 tons went to Canada; galvanized sheets, 14,947 tons, of

which 4754 tons went to Canada, 1523 tons to Brazil and 1787 tons to the Philippine Islands; black steel sheets, 11,724 tons, of which 6653 tons went to Canada and 3760 tons to Japan; black iron sheets, 1259 tons; steel rails, 13,919 tons, of which 4757 tons went to Canada; boiler tubes, 1594 tons; casing and oil line pipe, 8775 tons, of which 2390 tons went to the Dutch East Indies and 1299 tons to Mexico; black welded pipe, 9828 tons, of which 1157 tons went to the United Kingdom and 3209 tons to Peru; galvanized welded pipe, 5200 tons.

Imports of pig iron in April amounted to 8923 tons, of which 2048 tons came from the United Kingdom and 2149 tons from British India. Of the 2153 tons of ferromanganese imported, 1361 tons came from Canada. Structural shape imports totaled 11,796 tons, of which 9199 tons came from Belgium and 1502 tons from France. Steel bar imports were 8840 tons, of which 3890 tons came from Belgium, 2254 tons from France and 1312 tons from Germany. Cast iron pipe imports amounted to 8738 tons, of which 7078 tons was credited to France and 1088 tons to Belgium.

Railroad Expenditures for Iron and Steel Increased 21 Per Cent in 1926

CHICAGO, May 24.—The railroads of the country in 1926 expended \$507,302,186 for iron and steel products, the greatest sum ever spent in any one year for these products, and for the first time iron and steel took the lead, previously held by coal and other fuel, as the source of greatest expenditures.

This statement was made here today by W. G. Besler, first vice-president of the American Railway Association and chairman of the board of the Central Railroad of New Jersey, at the annual convention of the Purchases and Stores Division of the association. The sum spent in 1926 for iron and steel products was greater by 21 per cent than in 1925, said Mr. Besler, and came on top of a gain of 15 per cent between 1924 and 1925.

Purchases of new and second-hand steel rails in 1926 amounted to 2,503,991 tons at a cost of \$110,647,592, the greatest amount of steel rails that has been purchased by the railroads in any recent year, according to Mr. Besler. It exceeded by 326,000 tons, or 15 per cent, the amount bought in 1925. The total reported by Mr. Besler compares with an estimate of 2,462,200 tons of heavy rails and 800 tons of light rails made by THE IRON AGE in its annual number of Jan. 6, 1927. THE IRON AGE total, which included orders for new rails only, was less than 1.7 per cent smaller than the actual purchases of both new and second-hand sections.

Other iron and steel purchases made by the rail-

roads in 1926, by value, were listed as follows by Mr. Besler:

Wheels, axles and tires	\$61,421,089
Frogs, switches, crossings, track fastenings, and bolts, spikes, tie plates, rail anchors, etc.	83,901,021
Bridges, turntables, structural steel, bars, forgings, fabricated and unfabricated shapes and pressed steel parts.	66,939,790
Flues and tubes for locomotives and stationary boilers	10,240,873
Other iron and steel	174,151,821

Total expenditures by the carriers for fuel, materials and supplies in 1926, Mr. Besler said, amounted to \$1,559,032,331, of which \$473,353,928 was for fuel. The figures were based on a survey made by the Bureau of Railway Economics.

Pointing out the importance of the railroads as one of the principal contributors to national prosperity, Mr. Besler read figures from THE IRON AGE showing that estimates for 1926 placed railroad purchases at nearly 25 per cent of the steel output for that year, of which more than two-fifths was in the form of rails.

Thomas Spring Plant Not Affected by Fire

The report published in THE IRON AGE of May 12, that the plant of the Thomas Wire & Spring Co., Inc., 1006 Clinton Street, Hoboken, N. J., had been destroyed by fire, was erroneous. The fire was confined to a portion of the building not occupied by this firm, and manufacturing operations, it is explained, have been affected in no way.

Business Analysis and Forecast

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

Favorable and Unfavorable Factors Affecting Business May Be Summarized as Follows:

Favorable Factors

1. Retail trade sustained in large volume.
2. Bank debits reach a new peak in April.
3. Foreign trade larger in April; exports and imports both gain.
4. Laborers' purchasing power high.
5. Commodity prices more nearly stable.
6. Agricultural prices relatively higher; purchasing power of the farm dollar a little higher.
7. Money fairly easy; high Federal Reserve ratio.
8. Strong financial position of leading companies.
9. Light mercantile inventories.

Unfavorable Factors

1. Allowing for Easter, April retail trade showed a declining trend.
2. Declining trend in building activity resumed.
3. Business failures trend up; new enterprises down.
4. Narrowing profit margins; high wages begin to pinch.
5. Over-production and lower prices in the pig iron industry.
6. Highly irregular and spotty conditions in the automobile industry; large dealer inventories.
7. Serious over-production in the oil industry.
8. Floods in the Mississippi Valley; coal strike.
9. Manufacturers' Inventories large.

FAVORABLE and unfavorable conditions are in fair balance, but the unfavorable conditions are more active and positive; consequently a period of relatively dull and irregular business lies ahead. Readjustments are required in several industries in which over-production exists. Meanwhile, moderate recession will be the general effect. No reason is now apparent why a fair seasonal recovery should not occur in the fall.

AT first glance the chart showing the trend of business failures and the volume of new business enterprises established seems unfavorable. The trend of business failures is upward and, allowing for the growing number of business enterprises and seasonal conditions, the total in the last three months has been the highest reached in the same period of any year since 1922. In April, the number of failures was about the same as in April, 1925, or April, 1926, but our adjusted index shows a general rising trend since last August.

The trend of the volume of new enterprises established is sharply downward. New enterprises furnish

an index often very sensitive and particularly valuable as reflecting business sentiment. The chart shows clearly the recovery in new enterprises last winter which anticipated by a few months the improvement in business this spring. Now the enterprise curve has fallen sharply during March and April.

Thus we find the business death rate increasing at the same time that the business birth rate is decreasing.

Failures Usually Lag After Recessions

In the ordinary sequence of business events, however, this condition is not necessarily a "bad sign" as to the future. For example, a similar condition ex-

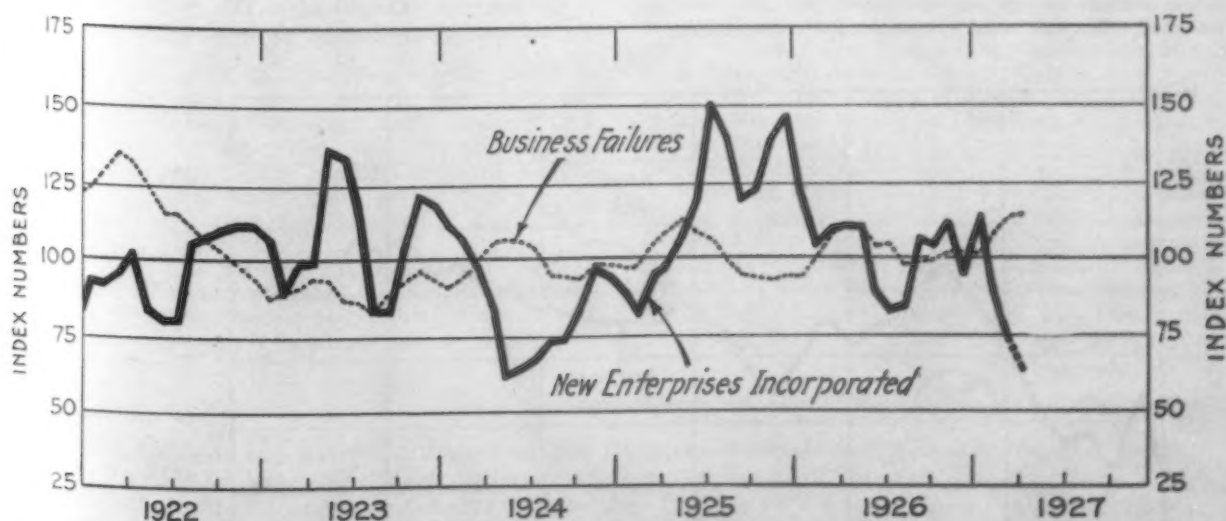


Fig. 1.—Business Failures Have Shown a General Rising Movement Since Last August. New business enterprises are declining sharply from the recovery reached in the winter. Both curves are plotted as three-month moving averages, to avoid excessive local irregularities

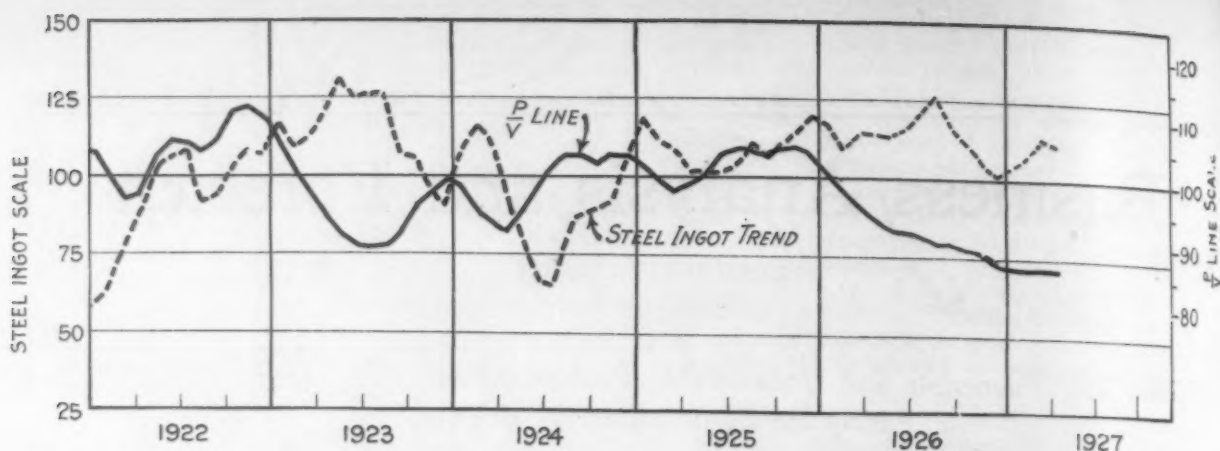


Fig. 2.—Continued Stability of the P-V Line, at the Lowest Level in Many Years, Appears to Foreshadow a Drop to Below Normal in Prosperity. Representing the ratio between commodity prices and the physical volume of trade, this line generally anticipates the trend of business by about five months. The steel ingot curve, after gaining substantially since December, has turned downward again

isted in the middle of 1921 and again in the middle of 1924. Both of these cases marked the end of periods of readjustment. In fact, business failures usually reach the peak after the worst of the business recession is over. There has recently been no such peak in the number of business failures as in early 1922, which fact may be taken to indicate that the amount of business trouble has been relatively moderate.

It is true that the trend of new enterprises, on the other hand, often foreshadows the business trend, and particularly the trend of building activity. We think it has done so recently and that the current decline in business and building activity reflects its movement. But new enterprises in April, allowing for seasonal conditions, had fallen to about as low a point as has been reached and the monthly figures show a greatly reduced rate of decline. Any further drop in the volume of new enterprises established would be extraordinary and a most unfavorable indication; but such a drop seems unlikely to occur.

Analysis of the business birth rate and death rate thus shows that present conditions are marked by declining profits, sharp competition, a large number of failures, uncertainty as to the future and a small volume of new enterprises. Precedent, however, would indicate that a period of readjustment is well along and that a turn for the better is possible within a few months.

Profits and Prosperity May Drop

OUR P-V line continues practically unchanged at the lowest level reached in a good many years. The level of this barometer, however, is not considered so significant as the direction of its movement. It appears to be below normal and the conclusion follows that business profits and prosperity will also fall a little below normal before any sustained upward trend is resumed. But one must remember that new standards

of performance in industry have been set during the past three years and it may be well that we have to revise our ideas as to normal—as is not infrequently required.

We take the recent action of the P-V line to indicate that the long decline in commodity prices is being checked, that prices on the average are so near to cost of production that the situation is already pending to curtail production and that a slight further decline in prices would have a decided effect. General demand for commodities is low in comparison with the supply and there is little probability of any expansion in production. Temporarily, however, demand and supply are in equilibrium. This condition is likely to exist until excessive production and inventories are corrected in those industries in which they exist.

Readjustment Likely to Be Easy

We are inclined to think that with the aid of abundant credit the readjustment may be effected without any great recession and that a period of rising trend may ensue. It must be remembered that most of the usual signs of a business crisis have not developed: speculation in commodities, over-buying by merchants, general over-production by manufacturers, strained credit, etc. In short, our discussion of the situation at the beginning of the year, in which it was indicated that a gradual and orderly recession, unattended by panic, would characterize the readjustment that would be required in 1927, now seems more probable than ever.

Much depends on the development of our crops, upon foreign trade, and upon the development of new wants among consumers to fill the gap left by declining building activity and the reduction in the volume of automobile production. One of the most serious factors is the weather. Conditions in this respect have thus far not been good. Neither do foreign conditions seem

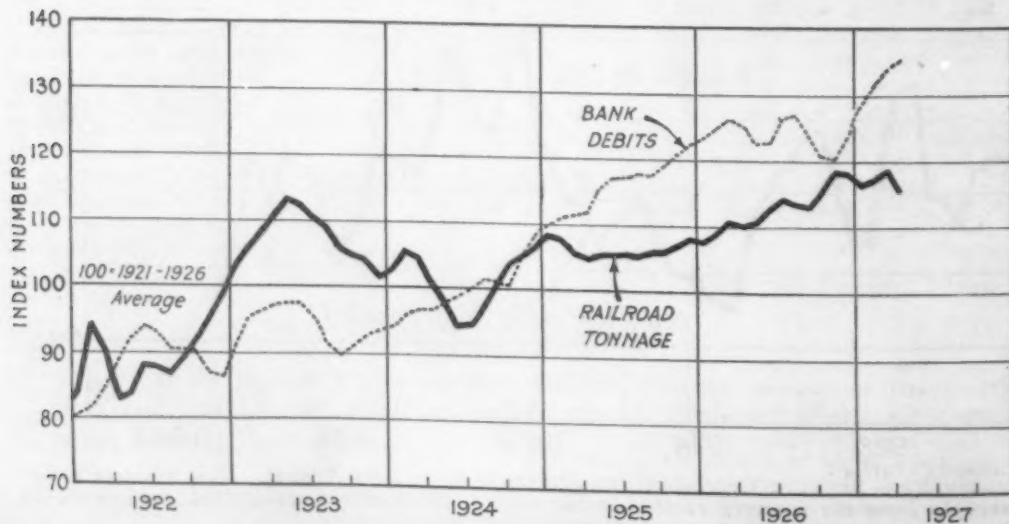
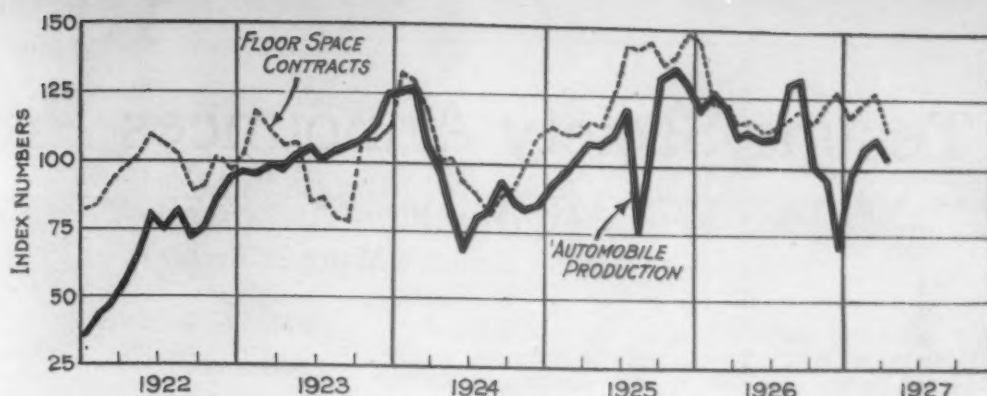


Fig. 3.—Railroad Tonnage Returns and Those for Bank Debits indicate That Trading and Speculation Are Still Exceptionally Active. Reduction in rail traffic, already under way, probably will be moderate

Fig. 4.—Building Construction and Automobile Production, While Still at High Levels, Both Turned Downward in April. The automobile industry is spotty and the boom in residential building appears to be over



to favor a sustained large export trade. No development in consumption has yet appeared which seems adequate to take the place of that which depended upon the housing shortage and the automobile demand of the past few years. Therefore, while recognizing the large purchasing power of the average consumer, it seems wise to take a conservative position as to the business future. No depression is probable; a good recovery is possible. But factors that would bring any large expansion of business are not now apparent.

All this is well illustrated by the steel industry. Here we find the demand irregular, dull and on the whole declining. Prices are sagging, profits are narrow, and in a good many cases prices must be close to cost. The trend of steel production was downward in April and early May. Pig iron appears to be produced to excess and lower prices are developing. Nevertheless, few observers could be found who expect the iron and steel industry to undergo any severe recession.

Freight Movement and Bank Debts High

RAILROAD freight traffic, after a rather steady upward trend throughout 1926, has ceased to expand (see Fig. 3). In fact, in the single month of April, the trend was downward. The course of the railroad tonnage curve is notable for the absence of any sharp peak such as occurred at the top of the 1923 business cycle, and the absence of excesses usually indicates that recessions will be moderate. This will probably be true of the trend of freight traffic. It is doubtful, however, if the volume shows much further rise, making due allowance for seasonal variations (which are marked in this case) and for normal growth.

Bank debts attained a new high point in April. The volume of checks drawn against individual accounts is clearly above normal, partly due to heavy speculation in stocks and partly to a large volume of retail trade. It is the more notable because of the lower level of commodity prices. We find it difficult to see how bank debts can continue to rise and think that speculation is outrunning the actual physical volume of trade.

Building and Automobiles Lagging

APRIL data show that building activity failed to make the usual seasonal gain in that month and our adjusted index (floor space basis) declined to a new low point for the period since 1924 (see Fig. 4). This trend is confirmed by a sharp decline in permits and in the value of contemplated new construction. It continues to seem clear that the trend in building will be gradually downward.

The automobile business continues spotty. Sales of the leading companies are large, but even in these cases the dealers' inventories are large, also. Production of automobiles tapered off in March and the April esti-

mate of around 417,000 cars and trucks means a considerable decline. Usually the trend is distinctly upward in April, which is generally the peak month of automobile production.

Tin in the United States

Nearly 90 per cent of the tin consumed in the United States goes into four uses—tin andterne plate, solder, babbitt and brass and bronze. All other uses combined take less tin than the least of these four. As given by the United States Bureau of Mines, the 1925 consumption of tin was as follows:

	Tons
Tin andterne plate.....	34,481
Solder	23,406
Babbitt	22,365
Brass and bronze.....	16,749
All other uses.....	15,405
Total	117,406

Only 12 tons of tin was produced in this country in 1925. Importations included 76,646 tons, while the amount recovered from scrap (secondary metal) was 27,633 tons. This made a total of 104,291 tons available. The difference between this and the consumption apparently was accounted for by drafts upon stocks.

It is stated that American consumption of tin absorbs 52 per cent of the world's output, and that 60 per cent of the American production of tin plate goes into tin cans or containers. The number of such cans in 1925 has been given as 8,300,000,000.

Lake Superior Mining Section of National Safety Council to Meet

The ninth annual conference of the Lake Superior mining section, National Safety Council, will be held at the Hotel Duluth, Duluth, Minn., June 22 and 23. The following committee will have charge of arrangements: A. A. Bawden, Pickands, Mather & Co., Ironwood, Mich.; F. C. Blake, Duluth Safety Bureau; E. W. R. Butcher, Republic Iron & Steel Co., Duluth; A. C. Borgeson, Shenango Furnace Co., Chisholm, Minn.; F. A. Pollock, Oliver Iron Mining Co., Eveleth, Minn.; O. R. Reaves, M. A. Hanna & Co., Duluth; F. C. Gregory, United States Bureau of Mines, Duluth, and L. L. Wilcox, Montreal Mining Co., Montreal, Minn. Papers will be presented by Percy A. Carmichael, M. A. Hanna Co.; W. H. Carrick, Corrigan-McKinney Steel Co.; A. V. Rohweder, Duluth, Missabe & Northern and Duluth & Iron Range Railroads; John F. Berteling, Pickands, Mather & Co.; Daniel Harrington, chief engineer Mine Safety Service, Bureau of Mines, Washington; Thomas Mitchell, Dupont Powder Co.; W. Dean Keefer, National Safety Council, and John P. Eib, Illinois Steel Co., Joliet, Ill.

Schedule of the next installments of the *Business Analysis and Forecast*, by Dr. Lewis H. Haney, Director, New York University Bureau of Business Research, follows: June 9—Activity in Steel Consuming Industries; June 16—Position of Iron and Steel Producers; June 23—General Business Outlook.

Testing Society Announces Program

Will Signalize Arrival of Silver Anniversary—Technical Papers Embrace Many Subjects

AN interesting technical program and celebration of the twenty-fifth anniversary of the American Society for Testing Materials are two features of the annual meeting to be held at French Lick Springs Hotel, French Lick, Ind., the week of June 20. The silver anniversary of the society will be signalized by a dinner, Wednesday evening, June 22, at the hotel. Special recognition is to be given to those members who have been continuously affiliated with the society during the past 25 years.

New Honorary Members

Arrangements have been made to confer honorary membership on three members of the society at this dinner. The executive committee has elected Robert W. Lesley, incorporator and past vice-president; W. R. Webster, incorporator; and A. A. Stevenson, past president, to honorary membership.

The Technical Program

The technical sessions follow the usual method of procedure obtaining in the past few years, with the metal sessions in the early part of the convention and the concrete and other subjects covered by sessions the latter part of the week. On Tuesday, June 21, at 2 p. m., an opening general session is scheduled at which the president, J. H. Gibboney, chief chemist Norfolk & Western Railroad, Roanoke, Va., will deliver some opening remarks, followed by reports of three committees: E-6 on papers and publications; E-9 on correlation of research; E-5 on standing committees. Announcement of the election of officers will follow and the transaction of some miscellaneous business. Programs for the sessions follow:

Tuesday, June 21, 3 p. m.

Session on Wrought Iron, Cast Iron and Magnetic Testing:

Committee Reports: A-2 on wrought iron; A-7 on malleable castings; A-3 on cast iron; sectional committee on specifications for cast iron pipe; A-6 on magnetic properties; A-8 on magnetic analysis.

Technical Papers: "Tensile and Transverse Strength of High-Strength Cast Iron," by M. E. Greenhow. "The Application of Magnetism to the Inspection of Steam Turbine Bucket Wheels," by J. A. Capp.

Tuesday, June 21, 8 p. m.

Session on Testing and Nomenclature:

Committee Reports: E-8 on nomenclature and definitions; E-1 on methods of testing.

Technical Papers: "Rate of Elongation in Tension Tests," by J. Hammond Smith. "Recent Developments and Applications of the Electric Telemeter," by O. S. Peters. "Tension Test Specimens for Sheet Steel," by J. T. Nichols. "Methods for Determining the Tensile Properties of Thin Sheet Metals," by R. L. Templin.

Wednesday, June 22, 9.30 a. m.

Session on Steel:

Committee Reports: A-1 on steel; A-4 on heat treatment of iron and steel; joint committee on the investigation of the effect of phosphorus and sulphur in steel; research committee on yield point of structural steel; A-9 on ferroalloys; research committee on effect of tin and arsenic on high-speed tool steel; joint research committee of A. S. M. E. and A. S. T. M. on effect of temperature on the properties of metals.

Technical Papers: "Embrittlement of Boiler

Plate," by S. W. Parr and F. G. Straub. "Tests of Steels at High Temperatures," by R. S. MacPherran.

Thursday, June 23, 9.30 a. m.

Session on Corrosion, Endurance Testing and Wear Testing of Metals:

Committee Reports: A-5 on corrosion of iron and steel; B-3 on corrosion of non-ferrous metals and alloys; D-14 on screen wire cloth; sectional committee on specifications for zinc coating of iron and steel.

Technical Papers: "A Rapid and Practical Method of Applying the Ferroxyd Test to Protective Coatings," by Karl Pitschner. "Effect of Corrosion upon the Fatigue Resistance of Thin Duralumin," by R. R. Moore. "Corrosion-Fatigue of Non-Ferrous Metals," by Dr. D. J. McAdam, Jr. "Tests of the Endurance of Gray Cast Iron Under Repeated Stress," by H. F. Moore and S. W. Lyon. "Wear Testing of Metals," by H. J. French.

Thursday, June 23, 8 p. m.

Session on Non-Ferrous Metals and Metallography:

Committee Reports: B-1 on copper wire; B-2 on non-ferrous metals and alloys; B-4 on metallic materials for electrical heating; E-4 on metallography.

Technical Papers: "Physical Properties and Methods of Test for Sheet Brass," by H. N. Van Deusen, L. I. Shaw and C. H. Davis. "Some Applications of the Spectrograph in an Industrial Laboratory," by F. A. Hull and G. J. Steele. "Fatigue Studies of Telephone Cable Sheath Alloys," by J. R. Townsend.

The annual address of the president, J. H. Gibboney, and the annual report of the executive committee by the secretary-treasurer, C. L. Warwick, will be delivered at the session Tuesday evening, June 21.

Marburg Lecture and Dudley Medal

The second Edward Marburg Lecture this year will be given by Dr. George L. Clark on the subject, "X-rays in Industry." Doctor Clark is professor of applied chemical research and divisional director of the research laboratory of applied chemistry in the Massachusetts Institute of Technology, Cambridge, Mass.

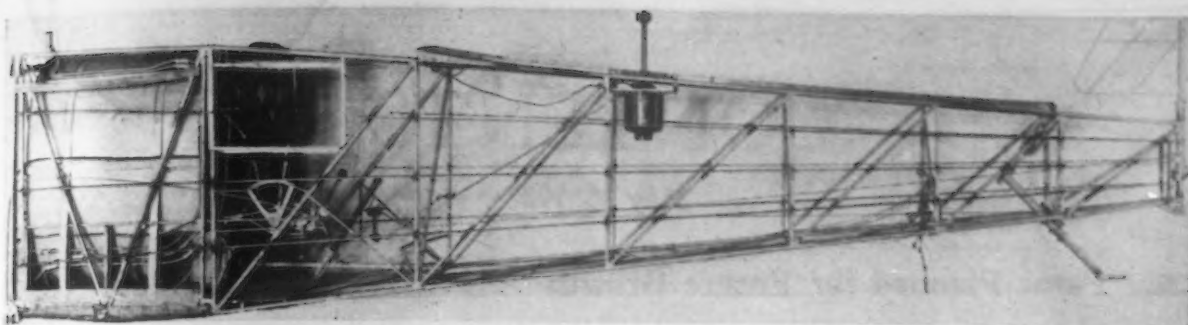
The first award of the Charles B. Dudley medal will be bestowed on Dr. D. J. McAdam, Jr., metallurgist, United States Naval Engineering Experiment Station, Annapolis, Md., for his paper entitled "Stress-Strain-Cycle Relationship and Corrosion-Fatigue of Metals," presented at the annual meeting last year.

To follow the twenty-fifth anniversary dinner, an informal dance and smoker is announced. Arrangements have been made for recreation in the form of golf and other diversions. As usual also on each day, various committees will hold special meetings, some of them commencing on Monday, June 20.

Arrangements have been made with the various railroads for reduced rates and there will be, if possible, special trains from New York and Philadelphia on June 18, 19 and 20. The chairman of the committee in charge of transportation is N. L. Mochel, metallurgical engineer Westinghouse Electric & Mfg. Co., Lester Station, Philadelphia.

Membership Increasing

The present membership of the society is 4118. It is hoped to increase this by 250 by the end of June. Over 22 municipalities and towns have taken out membership and efforts are being made to increase this. This is regarded as a satisfactory growth.



Lindbergh Plane of Conventional Construction

Framework of Fuselage Built of Molybdenum Steel Tubing, Welded at Joints—Standard Wright "Whirlwind" Motor Used

THE remarkable mechanical performance which made Capt. Charles A. Lindbergh's non-stop trans-Atlantic flight possible appears even more unusual in the light of the fact that the monoplane, "Spirit of St. Louis," was not an especially designed plane. Although built with a wing-span of 46 ft., from 2 to 4 ft. more than the span of the regular production ships of Ryan Air Lines, Inc., San Diego, Cal., the builder, it followed rather closely the normal specifications of the company's commercial planes. The Wright "Whirlwind" motor, manufactured by the Wright Aeronautical Corporation, Paterson, N. J., was of exactly the same type as that company manufactures for regular distribution, although particular care was taken in its detailed inspection and testing in order to eliminate as far as possible the element of faulty material.

Fuselage Made of Alloy Steel

The framework of the fuselage was made of chrome-molybdenum steel seamless tubing, with joints welded. It was covered with regulation airplane fabric. The engine and gas tank were mounted in the fuselage on a framework of chrome-molybdenum steel tubing, built to provide easy installation and removal. The cockpit was placed immediately behind the gasoline tank and was cowled in with metal in order to reduce head resistance. This made a periscope necessary for front vision. As shown in the accompanying photograph, which is reproduced by courtesy of *Aero Digest*, this

arrangement allowed space for storage immediately behind the cockpit.

Navigation was accomplished by means of a specially constructed instrument board placed on the cowl. Of particular interest was the earth indicator compass, manufactured by the Pioneer Instrument Co., Brooklyn. This was made up of an indicator, a controller and a generator, the last placed in the fuselage behind the cockpit, and operated by a small windwheel mounted on top of the fuselage.

The Wright engine was model J-5C, air cooled, of the fixed, radial type of nine cylinders with a 4.5-in. bore, a 5.5-in. stroke and a displacement of 788 cu. in. It was rated at 200 hp., and weighed 508 lb. The motor was shipped to San Diego and installed in the plane and received no special attention during the flights to St. Louis and from St. Louis to New York. It was thoroughly checked over by the Wright company prior to the trans-Atlantic flight, but not disassembled.

The entire construction of the plane was of the conventional type in accordance with modern practice. The wings were of the Clark Y-wing curve type, constructed with wood spars and ribs internally braced and fabric covered. Specifications of the plane as prepared for the trans-Atlantic flight were as follows: Span, 46 ft.; gross weight, 5150 lb.; gasoline, 425 gal.; wing loading, 14.9 lb. per sq. ft.; maximum speed with full load, 123 mi. per hr.; cruising speed, 105 mi. per hr.; minimum speed with full load, 69 mi. per hr.

Employment Declines in Metal-Working Shops

The first decline in employment this year was reported for the month of April by plants affiliated with the National Metal Trades Association, Chicago. The total number of employees for that month was 613,979, as compared with 622,503 for March and 615,179 for February. The April figure also falls short of that for April, 1926, which was 653,898. Reports are received from plants in New England, New York, New Jersey, Pennsylvania, Maryland, Ohio, Indiana, Illinois, Michigan, Wisconsin, Iowa and Missouri. The only gains for April were reported by New Haven, Conn.; Buffalo; Indianapolis; Muskegon, Mich.; St. Louis; Peoria, Ill., and the Tri-Cities (Moline and Rock Island, Ill., and Davenport, Iowa).

Ford Motor Co. to Increase Open-Hearth Capacity

The Ford Motor Co., Detroit, has commenced the erection of three additional 100-ton open-hearth furnaces, making seven in all. The present four furnaces are of the tilting type, but the new ones will be of the stationary type. The Ford company is also building two additional soaking pits, making six in all. The company's 12-in. spring mill is now being erected and will probably be ready for operation in the fall. The

extensions to the company's rolling mill equipment, as announced some time ago, included a 10-in. combination mill for rolling both steel and copper. Plans have been changed for this type of mill, which will be a 10-in. combination merchant mill for rolling rod, bars and strip steel.

Copperweld Steel Co. Buys Glassport Plant

The Copperweld Steel Co., Rankin, Pa., has purchased and will occupy the plant of the Kelly Axe & Tool Co., Glassport, Pa., following the installation of rolling mills, already purchased, and the completion of some minor changes to the Kelly plant to accommodate the business of the Copperweld company. The Glassport plant has not been used since 1919, when the axe and tool business of the Kelly company was concentrated at its Charleston, W. Va., plant. In its new location the Copperweld company will have 10 acres under roof, or five times the floor space in its present works, and a tripling of its present production will be possible, since for the new plant the company has bought a 24-in. 2-high three-stand billet mill and one 14-in., one 10-in. and one 8-in. bar mills, all equipped with variable speed motors working through gear sets. Only such equipment at the Rankin plant as will be serviceable will be moved to Glassport. J. M. Roth is president of the company, S. E. Bramer, vice-president and general manager, F. R. S. Kaplan, secretary.

The Iron Age, May 26, 1927—1545

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Serving the Industry Through Its Conventions

SO great has been the volume of information developed in this favorite month of conventions that recent issues have been particularly heavy in relation to primary materials used by the metal-working trades. The pressure has required leaving for later issues much of direct practical value in respect to the working and handling of those materials.

Meanwhile the reports have been up to the minute (that of the Iron and Steel Institute of Great Britain bringing to American readers the first full account published anywhere), and so remarkably full that consumers should be able to glean a great deal of importance as to conditions affecting quality and availability of supplies for new and continuing needs. It is repeating a truism to say that the business periodical is a record of the economic and technical progress of the industry served.

This Issue in Brief

Is commodity price decline being checked? The steadiness of the P-V Line may indicate this, says Dr. Haney. Perhaps prices are so near to cost of production that output is being curtailed.—Page 1542.

New force in business rises above mere money-making. The head of the National Industrial Conference Board remarks on the steady elevation of business standards and the new attitude of regarding business in the light of a profession. — Page 1524.

Heat is lost by gases actually passing through refractory brick. Metallurgist proves by demonstration that gas goes through the brick itself. The time for a given amount of gas to escape in this way bears no relation to the density of the gas, but depends more upon its physical character. Brick manufacturer declares that the loss is negligible, as glaze formed on the brick quickly makes it impermeable.—Page 1522.

Plans plant requirements 20 years ahead. Basing its estimates of future plant needs on past expansion, Milwaukee firm hopes to avoid unnecessary waste usually borne by manufacturers who fail to provide for future growth.—Page 1509.

Prevents transmission of shop noise and vibration by dirt floor insulator. Storeroom between offices and shop has a dirt floor, which, unlike a concrete floor, acts as a deadener.—Page 1512.

Gradual loss of ductility in service is usually due to contaminating substances in the metal, though sometimes corrosive attack from an outside source is responsible. In the latter case the only remedy is to reduce the stress acting upon the metal or to eliminate the corrosive attacks.—Page 1512.

Makes strip steel of greater accuracy in new four-high roll mill. Laclede plant secures almost perfect alinement and flatness in the finished strip by employing a new idea in the design of runout and hot beds.—Page 1526.

Flaws in wire can be detected by X-ray. Internal defects are readily revealed. However, it is questionable whether this method of testing will ever be widely used, considering the amount of time that would be consumed in testing any quantity of wire.—Page 1529.

Welded steel structure costs more. Skeleton for five-story shop building erected by Westinghouse could have been erected at less cost by riveting. However, it is possible that some parts of steel structures might be welded to advantage.—Page 1515.

Declares that blast furnace is a better gas producer than iron smelter. Inefficiency is due to the fact that air nitrogen absorbs a good part of the available heat, says speaker at Institute meeting. Not so, say Government metallurgists.—Page 1516.

Recommends heating high-strength aluminum alloys to 910 to 985 deg. Fahr. This brings the soluble constituents into solution and improves the properties of the alloys themselves, as well as producing susceptibility to hardening by natural or "artificial" aging.—Page 1536.

Estimates automobile's average life to be 7½ years. One economist declares that the saturation point will come in 1932, when 18 million cars will be used. Another fixes the period at six years later, when 25 million cars will be on the road.—Page 1539.

Says forging buyers would be helped by standardization of die notches in rams and sow blocks of forging hammers. Hammer manufacturer suggests that four or five sizes of notches be adopted as standard.—Page 1532.

Business failures increase while new enterprises decrease. But this is not necessarily a bad omen, says Dr. Haney, for failures are usually heaviest at the end of a period of readjustment, rather than during it.—Page 1542.

Pittsburgh best district in which to engage in production of iron and steel, says Bethlehem statistician. Believes Pittsburgh mills are most favorably situated and declares that the Steel Corporation's dominant position is growing more pronounced.—Page 1553.

Is the torsion test or the bending test best for determining the strength of wire? English favor the torsion test, while recent German authorities favor the to-and-fro bending test at right angles.—Page 1528.

Maximum fine dust production permissible is 400 lb. per ton, says blast furnace superintendent. He finds that if production exceeds this figure for a continued period, inferior furnace operation results.—Page 1518.

Warns against sharp drops in temperature in preheating high-speed steel. Furnace should be large enough so that temperature will not drop more than 50 deg. Fahr. when new pieces are placed in it, says metallurgist.—Page 1537.

Flow of welding metal in arc process is photographed with special film. Pictures reveal that most of the metal passes across by capillary attraction.—Page 1538.

ESTABLISHED 1855

THE IRON AGE

A. I. FINDLEY, Editor

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Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York
C. S. BAUR, General Advertising Manager

F. J. Frank, President

George H. Griffiths, Secretary

Owned by the United Publishers Corporation, 239 West 39th Street, New York. A. C. Pearson, Chairman. F. J. Frank, Pres. C. A. Musselman, Vice-Pres. Fred C. Stevens, Treas. H. J. Redfield, Secy.

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 425 Park Square Building. Philadelphia: 1402 Widener Building. Cleveland: 1362 Hanna

Building, Detroit: 7338 Woodward Ave. Cincinnati: First National Bank Building. Buffalo: 835 Ellicott Square. Washington: 536 Investment Building. San Francisco: 320 Market St.

Subscription Price: United States and Possessions, Mexico, Cuba, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single Copy 25 cents.

Entered as second-class matter, June 18, 1879, at the Post Office at New York, N. Y., under the Act of March 3, 1879.
PRINTED IN U. S. A.

The Labor Union Combat

JAMES O'NEAL, editor of the *New Leader*, speaking before the Henry George Club of Baltimore last week, said: "With the large loss of membership since the peak was reached in 1921, the American labor unions have still maintained a lead over their 1914 figures. Their biggest task today is to combat the company unions and the welfare programs which are the biggest factors in undermining labor unionism."

That is simply making labor union an end instead of a means to an end. If these activities are undermining unionism, they are doing so by supplying things which the unions cannot so well supply. The preservation of labor unions is set up as an objective in itself. Then the officials of labor unions would be the chief actual beneficiaries.

Perhaps, however, the meaning intended was not just what the words seem plainly to imply. Possibly the idea was that the company unions and welfare work offer the workman other things than the labor union seeks. Then the implication would be that the workman is deluded by preferring these other things and the function of the labor leader is to make him see that the labor union's objectives are really the better for him.

The company union offers cooperation and prompt redress of grievances or explanation with respect to supposed grievances. Obviously that is desirable if the good of the workman be the objective. If continual contest be the objective, then it is not.

The company union does not connive at limitation of output. The typical labor union does more than connive. The record of performance is clear, as are the utterances of "organizers" when they seek recruits. It cannot be questioned that limitation of output is economically harmful; hence when labor unions promote limitation they do so to the disadvantage of others. If all workers belonged to equally successful labor unions, very little exploiting would be left to be done. Per contra, if the labor unions go one by one, the last union, if strong enough, will have the largest field of all in which to conduct its exploiting. Perhaps

this explains why labor unions as a whole have not lost much more than a million membership since 1921.

To cooperative work Mr. O'Neal, like other union spokesmen, is disposed to object. The familiar recourse is to such words as "paternalism" as opposed to the "independence" of the worker. But betterment work aims at health, education and culture. Do not these things tend to make a man independent of disease and of the limitations of his environment? The only independence the labor union offers the member is independence to fight, and even that must be done under orders.

Mr. O'Neal merely confirms the belief that labor unionism regards itself as an end rather than a means to an end; its end, as its beginning and middle, being combat.

The Lindbergh Partnership

IN all his comments on the flight that thrilled six continents, Captain Lindbergh has used the pronoun of the first person plural. This way of saying that he and his monoplane were partners in the exploit is more than mere fancy, or the gesture of a modest youth suddenly become famous. Doubtless Captain Lindbergh has a highly developed flying sense which, joined to his habit of identifying himself with his machine, makes him in more than one respect a super-airman. But he spoke simple truth when he said at Paris, "I cannot say too much for my engine."

It was not so many years back that the plane of the brothers Wright could get but a few feet above the ground, weighed down as it was by a heavy engine. Today, the 200-horse-power whirlwind motor of the Ryan plane is both lighter and stronger than its Wright prototype of 25 years ago. The crankshaft and other important parts are of high-grade alloy steel, heat treated according to the latest practice, and because of this surpassing the motor of even a year ago. In the plane itself, again combining strength with lightness, molybdenum steel tubing, joined by welding, constitutes the main part of the fuselage. Only the best quality of steel, made capable of the highest performance

by heat treatment, could have stood the test of that 3700-mile journey, with its more than three million motor revolutions.

Some historians of air travel may write of the Lindbergh flight as making no contribution to technical progress. But such a view falls short of the truth, making all allowance for the admiration of a daring pacemaker that is so large a factor in the week's acclaim of a new American hero. No single event could have given a more powerful stimulus to trans-Atlantic flight or to the development of air traffic at home through the establishment of airports, lighted airways and radio aids to aerial navigation. Whatever subtraction be made for the enthusiasm of the hour, the Lindbergh triumph will be a lasting monument to the successful partnership of a super-flier, a super-engine and super-steel.

A Difficult Oil Situation

As we have previously pointed out, the petroleum industry has a direct connection with iron and steel through its extensive use of tank plate and pipe. It has, of course, many less direct connections; and also many, both direct and indirect, with other industries, indeed with the entire national economy. The distressing conditions of over-production and disappearance of profits that now exist in the petroleum industry are therefore of vital concern to almost everybody, not merely to stockholders in oil companies. For this situation the extraordinary Seminole field in Oklahoma is primarily responsible.

Since the discovery of this group of pools, less than a year ago, about 400 wells have been drilled at a cost of about \$28,000,000. Steel storage has been provided at a cost of \$7,200,000, pipe lines at \$10,000,000, and well and line equipment about \$7,500,000, a total of nearly \$53,000,000. The production has been about forty-six and a half million barrels of crude oil, at first realizing \$2.69 per barrel, but now only \$1.38, the bulk of the output having fetched nearer the lower price than the higher. Considering the cost of the land leases and the royalty of one-eighth of the production due the landowner, it is obvious that Seminole has not yet been the bonanza that was hoped. The data we have cited bring out the economics of the position.

There is, of course, no waste of a natural resource, seeing that all of the surplus oil is tanked. There may be, and probably is, a waste through profligacy in consumption, inspired by the low price for the resulting gasoline. The clearest economic waste is in the financial aspect; in the exigency to do excessive drilling, to provide excessive plant and to carry excessive stock of the product.

It is the fundamental condition of petroleum production in the United States that is responsible for this. An oil field may be of large area. Seminole appears to embrace ten or twelve square miles. The oil rights are acquired by lease of relatively small tracts, many competing producers rushing into a field and mapping it out among themselves like a checkerboard. Oil being a migratory substance, each company must perforate the productive sand with as many wells as possible to drain the pool as quickly as possible lest its competitors get ahead of it. Hence excess of wells, of tanks, of pipe lines, etc.

Economically and scientifically every oil pool ought to be exploited as a unit, but how to manage that under our conditions of land ownership and free competition nobody knows. Mr. Teagle, of the Standard Oil Co. of New Jersey, has made the most practical suggestion to the effect that when new discoveries are made the producers acquire participations in it rather than sole interests in pieces of land. This implies collusion among producers, which obviously requires governmental sanction, and it is questionable whether a recalcitrant landowner could be deprived of his rights. The purpose would be to regulate production with respect to consumption, and improve prices, wherefore governmental price regulation would loom in the offing.

How could we stop short of a petroleum cartel, supervised by the Federal Government? Moreover, the petroleum producing States have an interest in the matter, which is likely to be different from that of the people in non-producing States. The subject bristles with difficulties, which is, of course, the reason why it has not heretofore been mastered.

The case is of such great national importance that it should receive the early attention of Congress. It would not be too much to ask, in view of the migratory character of the substance which distinguishes it from most of the other minerals, that petroleum producers should be unshackled from the Sherman law and absolved from all fear of punishment for collusion in so far as individual oil fields are concerned and should be favored at least with the encouragement of pool exploitation. Fortunate is the oil producer which now possesses the property right to a whole pool and can leave its oil in the ground until market conditions are ripe for it, as the owner of non-migratory minerals theoretically can do. In the meanwhile the petroleum industry is left to the natural operation of the law of supply and demand, which is sure but slow, and also painful and wasteful.

1927 as an Automobile Year

It is reasonably certain, from the statistics of automobile production in the first four months of 1927, that the year as a whole will show a decrease from last year, and the probability is that the decrease will be less than 10 per cent. All things considered, and some of them have a complicated influence, the fairest guess at the present time seems to be that the decrease will be in the neighborhood of 5 per cent. That would mean about 4,100,000 passenger cars and trucks produced in the United States and Canada in 1927, and would make the year third best, as 1926 ran less than 3 per cent above 1925.

If the course of production in previous years had established a clear-cut seasonal swing, forecast would be easier. There have been substantial variations, due to special conditions which are a matter of history, and the monthly production figures of the past five years become more coherent when allowance is made for these conditions, including steadily improving business in 1922, an excessive anticipation of spring demand in the first two months of 1924, and the delay in August and September, 1925, in production of the new Ford model.

Except for the slump in its last three months

1926 may be considered fairly typical of normal expectancy for production in the respective months, and a month by month comparison of production this year and last is logical. January ran 21 per cent below January of last year, February ran 15 per cent below its month, March 8 per cent below, and April only 6.6 per cent below. Thus the upswing in production, when last month's make was 69 per cent above that of January, represented in part a general recovery, not being entirely a seasonal increase.

It is clear that there is no general slump in the automotive industry. While the four-month total of passenger cars and trucks in the United States and Canada, 1,398,659, is 11.8 per cent below the 1,586,487 in the first four months of last year, trucks in the United States gained 9.6 per cent, while passenger cars lost 15.1 per cent. Trucks in Canada lost 6.5 per cent, but passenger cars gained 6.6 per cent.

The distinct slump last year after September is something that had not occurred in previous years and is not to be expected for the future. Thus there are two points: First, in January and February of this year there had not been complete recovery. Second, the last three months of this year should bear a better relation to the preceding nine months than was the case last year. Accordingly the prospect now is that this year will run less than 10 per cent below last year.

This may not be a satisfactory prospect for the purveyors of the raw materials of automobile manufacture, habituated to an expectation of gains year by year. It is also to be said that the foregoing statistics refer to number, and there may be a decrease in the average weight. There may be slight further savings, too, in the consumption of material relative to the amount that appears in the finished unit. The automotive industry promises to be a steady customer, steadier than has lately been expected, but by no means a rapidly growing one.

Pay Envelope Annoyances

HOW a trivial thing, of so little apparent account that it never comes to the attention of managing officials, may prove a disturbing influence in an industrial organization, is illustrated in a complaint voiced recently by a young workman employed in a large New England machine shop. His wage is slightly over \$25 a week. His pay envelope, he said, invariably contains a \$20 bill and a \$5 bill, with the remainder in a small bill or two and some coins. The \$20 bill was the cause of his complaint. He was almost always put to some inconvenience in getting it changed and sometimes he had real difficulty.

An investigator followed up the complaint and found it a common one. Paymasters as a rule have a well-established system and in making up their payrolls plan the minimum of pieces of money required both in bills and fractional currency. A wage over \$20 gets a \$20 bill, one over \$30 a twenty and a ten, one over \$40 two twenties. So it is throughout the payroll, even to the fractional currency. In requisitioning the bank for payroll money, the denominations required are designated in detail—so many twenties, so many tens, and so

on down the list. It is a form of efficiency, to reduce time and labor in the paymaster's office. The practice has its exceptions. Some firms have come to recognize it as unpopular. One large plant, for example, insists that nothing larger than a \$10 bill shall go into a pay envelope.

The difficulties employees have in getting money changed have become more acute, because merchants who used to carry large sums in small bills for this purpose, and thus bring trade into their stores, do not have so much money about, because of the frequency of robberies. People who work in shops seldom have opportunity to visit a bank. A similar problem has arisen with the increasing use of checks in the payment of industrial workers. In some cases where the check system has been adopted employers have cooperated in finding places where workers may get their pay checks cashed, this being made easier by the employers' guaranty against loss by forged indorsement. Similar provision has seldom been made for the changing of bank notes of large denomination. The question is whether a plant gains enough in economy in the paymaster's office to offset the effect of what employees may consider an unnecessary annoyance.

CORRESPONDENCE

Galvanized Roofing Weights

To the Editor: The constant controversy between the mills and consumers in regard to weight of roofing products is one of considerable interest, especially when calculated to a theoretical basis. Galvanized flat sheets are rolled and sold on the galvanized sheet gage, this being a measure of weight per square foot in which each gage number represents 2½ oz. per sq. ft. heavier than the corresponding United States standard gage. Since the majority of roofing products are sold in 26 to 29 G. S. G., only these gage numbers will be considered in this discussion.

Under the existing No. 24 gage base we find that No. 27 sells for \$2 per ton above No. 26; that No. 28 sells for \$3 per ton more than No. 27; that No. 29 sells for \$4 per ton more than No. 28; and that No. 30 also sells for \$4 per ton above No. 29. To picture further the difference between gage numbers, the following table is of interest:

G. S. G.		Sq. Ft. per Net Ton	When Rolled Light by This Per Cent	Is Equal to This Gage
No.	Oz.			
26	14.5	2,207	6.9	27
27	13.5	2,370	7.4	28
28	12.5	2,560	8.0	29
29	11.5	2,783	8.7	30
30	10.5	3,048	9.6	31

Since the mill rolls on a weight gage basis, and since sales extras are computed on the same basis, it is natural that roofing products be sold by gage number.

In producing galvanized sheets we have two main items in cost, namely, the black sheet and the coating, both of which affect each other. Since the finished weight after coating is the governing factor, the weight of the black sheet is determined after an assumed weight of coating and an assumed pickle loss have been figured. If the assumption were absolutely correct, then the only variations in weight would be the variations in the black sheet.

In general, we say that the weight of a lot, being all of one gage and size in a shipment, shall be within 2½ per cent, plus or minus, of the theoretical weight. In THE IRON AGE, Vol. 113, Nos. 7 and 12, a very clear discussion of tolerances and variations in weights showed that this figure should be qualified, due to the fact that variations in bar, sheet, pickling, cold rolling, shearing, etc., might be compounded and such a figure as 2½ per cent was entirely too small.

At present many consumers are objecting to granting the mills even the old 2½ per cent figure, which gives a total spread of 5 per cent, and expect the mills to hold to a spread of 2½ per cent, which is expecting the impossible, in view of the fact that, in addition to variations in black sheet weight, there is also the variation in coating and pickle loss.

Costs Increase as Gage Lightens

While it must be admitted that in rolling black sheets the tonnage labor cost breaks at definite points, other items of cost prorated on a ton, or even on a turn basis, will gradually increase as the gage becomes lighter. In addition to this, as the gage is reduced, the area coated increases, which means more spelter used.

For example, No. 29 rolled 8.7 per cent light would be No. 30, which would sell for \$4 per ton more. At the mid-point, namely, No. 29, 4.3 per cent light, the extra should be \$2 above No. 29. Since the present galvanized sheet gage differentials are sharp breaks in place of gradual increases, many customers expect to be billed at the price of the heavier gage, provided the ordered weight is not over the half-way mark.

While some mills state, in reference to gage, that if maximum or minimum be ordered double tolerance is to be taken on permissible side, this causes trouble both to the mill and the consumer; first, because if rolled 2½ per cent light the mill must coat more area; and, second, if material should run 5 per cent light, the ultimate customer would find material nearer No. 30 gage and believe he was entitled to rejection.

If the mill sell by weight and jobber sell by area, it is, of course, to the jobber's benefit to get it as light as possible, to increase his profit. A small percentage either way makes quite a difference, and therefore the calculations must be carried out accurately. As galvanized flat sheets are the material rolled by the mill, if we refer to standard bundling tables or calculate the square footage, we find that a sheet of a certain size has a certain theoretical weight, based on the gage in weight per square foot. Bundling tables all state weight does not include bands and are calculated on exact size. Therefore, if mill sheared or banded, the excess area or band weight must be added to the theoretical, to calculate properly the exact gage equivalent. This figure, according to present practice, is understood to be within 2½ per cent, plus or minus, of the ordered gage (weight per square foot).

Calculation of Jobber's Benefit on Pound Basis

When a jobber requests a mill to sell him on the pound basis, No. 29, 10-ft. corrugated material in standard 2½ in. that will not weigh over 77 lb. per square with bands, mill sheared, we find the following:

100 sq. ft. of 2½-in. corrugated, 26 in. wide = 1 square, covering area (no laps)

1 square 26-in. with 2½-in. corrugations, made from 28 in. wide = 107.692 sq. ft.

2 bands per bundle 1 in. x 30 in., No. 18 U. S. S. G. = 0.83 lb. per bundle.

Overage in shearing (½ tolerance) = ½ in. width; ½ in. for up to 8 ft.; ¾ in. for 9 ft. and 10 ft.; 1 in. for 11 ft. and 12 ft.

On 10-ft. sheet of this area is above exact size by 0.881 per cent.

1 bundle 10 ft., 2½-in. corrugated, 26 in. wide = 2.1666 squares.

Bands per bundle (0.83 lb.) ÷ 2.1666 squares = 0.382 lb. of bands per square on 10-ft. sheets.

Therefore: 77 lb. per square = ordered, finished and bundled weight

Less 0.382 lb. per square = bands

76.618 lb. corrugated 28 in. wide sheets

Less 0.881 per cent 0.674 lb. overage in size

75.944 lb. per 100 sq. ft. as sold.

This weight per square of 75.944 lb. is made up of 107.692 sq. ft., or 0.7052 lb. per sq. ft., or No. 29, 1.94 per cent light.

Originally the weight per square on corrugated and formed products was a figure sufficiently low so that a mill could guarantee it as a minimum weight for the gage number rolled, after taking into consideration variations in rolling that could not be avoided. Now

the practice seems to be to use this square weight as a maximum, never to be exceeded, with an average considerably lighter. Extras for sheets are definitely established and when material is rolled in fractional gages, without applying the same proportional gage extra, then the mill has made a price concession, which is in effect a cut in base price. No. 29 galvanized 26 in. wide does not weigh 77 lb. per square, and when so ordered is not No. 29. If bands were omitted and the flat sheets resquared to exact size then No. 29 would weigh 77.43 lb. per square. The controversy will still continue, but why not look the actual figures in the face?

F. G. WHITE.

718 Trinity Avenue,
University City, St. Louis.

Suggests Fluorspar Be Sold on Analysis Basis

To the Editor: Fluorspar is bought by the makers of basic open-hearth steel only for its content of net calcium fluoride. Therefore, the analysis (now standardized) of 85 per cent calcium fluoride and not to exceed 5 per cent silica develops a net calcium fluoride of 72½ per cent, after allowing, as has been established by the leading steel companies, a reduction of 2½ points of calcium fluoride for each point of silica.

Calcium fluoride runs evenly in regular practice 85 per cent or a trifle over, whereas silica, owing to the nature of the deposits of fluorspar, varies from 1 to even as high as 8 per cent. How the silica content affects the net calcium fluoride is illustrated below.

Calcium Fluoride Per Cent	Silica Per Cent	Equal to a Net Calcium Fluoride Content of Per Cent
85	0	85
85	1	82½
85	1½	81½
85	2	80
85	2½	78½
85	3	77½
85	3½	76½
85	4	75
85	4½	73½
85	5	72½
85	5½	71½
85	6	70
85	6½	68½
85	7	67½
85	7½	66½
85	8	65

Calcium Fluoride (Ignoring Silica) Per Cent	Cost at Mine Based upon Fluorspar at \$20 per Net Ton at Mine Per Unit
80	equals a cost of 25.00c
81	equals a cost of 24.70c
82	equals a cost of 24.40c
83	equals a cost of 24.10c
84	equals a cost of 23.80c
85	equals a cost of 23.53c
86	equals a cost of 23.26c
87	equals a cost of 23.00c
88	equals a cost of 22.72c
89	equals a cost of 22.47c
90	equals a cost of 22.22c

Silica Per Cent	Reduction in Calcium Fluoride Points
0	0
1	2½
1½	3½
2	5
2½	6½
3	7½
3½	8½
4	10
4½	11½
5	12½
5½	13½
6	15
6½	16½
7	17½
7½	18½
8	20

It is evident that the higher the net content of calcium fluoride, the less fluorspar used.

The only other impurity of any consequence, provided sulphur is practically eliminated, as is generally the case, is calcium carbonate (lime), which, while not objectionable, when paid for in fluorspar, is too costly.

Until the present high cost of mining and concentrating fluorspar developed, not much attention was paid to its analysis, but conditions are different now and the price justifies close attention to the quality both in buying and using.

G. H. JONES,

President Hillside Fluor Spar Mines, Chicago.

Western Mills Favor J. & L. Scale

Ask for Same Rate Basis Eastbound—Valley District Complains of Alleged Rate Disadvantages

PRESERVATION of home markets, stability of rates and less disturbance to existing group relationships were among the objectives sought by Chicago producers who appeared before Commissioner Johnston B. Campbell in the closing sessions of rate hearings held by the Interstate Commerce Commission at Chicago. Western steel makers were solidly back of the "15,110" scale prescribed in the original Jones & Laughlin case and laid down by the commission on westbound traffic, but they have entered a complaint asking that the same basis be applied eastbound, so that producers in the Middle West will be on a competitive basis with Pittsburgh manufacturers of steel. A firm stand was also taken in support of the Illinois carriers' published rates that are based on the 15,110 scale, using reasonable groups of points of origin and destination, as prescribed by the Interstate Commerce Commission.

The Pittsburgh "Plus" basis of selling came up for further discussion when a witness on cross-examination was asked if it represented anything more than the trade practice of getting the best possible price for a product. The witness replied that it meant that Pittsburgh could compete in any market, however far removed, on a parity with any other producer.

The fairness of the 15,110 rates, which encourage short-haul traffic, was questioned at the May 14 hearing by W. W. Collins, counsel for the Jones & Laughlin Steel Corporation, who pointed out that Chicago had a rate of 9½c. per 100 lb. for 118 miles on certain traffic and that the longest movement out of Pittsburgh for that rate is 60 miles.

Chicago Base Price on Pipe Applies Only in Restricted Zone

Counsel for the Youngstown Sheet & Tube Co. sought to show a selfish attitude on the part of Chicago producers in advocating high rates on long hauls. He referred to previous testimony, in which it had been stated by one Chicago producer that most of his bar business was sold in a radius of 100 miles of Chicago. Testimony then disclosed that production of steel pipe in Chicago was not sufficient to supply the immediate and Southwestern territory, but it was contended that Chicago mills could not get the normal base price on that commodity outside of a radius of 150 miles. Efforts to obtain a direct statement to the effect that the territory adjacent to Pittsburgh and Youngstown could not absorb the output of that region were without avail though it was contended that there was no more necessity for long-haul rates from the Pittsburgh district than from the Chicago district.

Each producing territory, said R. C. Livingston, traffic manager Interstate Iron & Steel Co., Chicago, should have the same adjustment to its short-haul territory as the others. As an example of unfairness to Chicago he pointed out that the rate from Terre Haute, Ind., to Chicago is 18c., as against 13c. in the opposite direction.

James J. O'Rear, traffic manager Acme Steel Co., Chicago, manufacturer of hot and cold-rolled strip steel, which is sold principally in Central Freight Association, Trunk Line and New England territories, said that his company will willingly accept the Jones & Laughlin scale to the Eastern seaboard if it works both ways, but on long distances, 1000 miles or more, larger groups should be provided.

Says J. & L. Scale Is Superior to Disque Scale

Chicago interests completed presentation of their case in Docket 18,688 on May 16. W. J. Hammond, traffic manager Inland Steel Co., Chicago, said that the Disque fifth-class scale, now applying to iron and steel eastbound from Chicago, is too high for short hauls

because it is based on terminal studies of cost of less-than-carload traffic. This scale, he said, is "pinched at the top," and the rate of progression on long hauls is too low because it was made to fit the then existing carriers' rate between Chicago and Pittsburgh. Although the results are high rates for short hauls and comparatively low rates for long hauls, it is his opinion that the scale in no way reflected the requirements of iron and steel traffic. He also objected to other scales introduced that bear a percentage relationship to the fifth-class scale. He contended that the Jones & Laughlin scale met the needs of the commodity in question. Its rate of progression for the first 100 miles was based on terminal study, and beyond that distance, he said, the rate of progression should be the same, because terminal expense is met in the first 100 miles and beyond that there is no difference in service. He could see no reason why the fourth and fifth 100 miles of a shipment should cost less than the second or third.

Figures presented by Joseph T. Ryerson & Son showed that the average shipment from their warehouses was about 20,000 lb. Robert C. Ross, traffic manager for that company, testified that many jobbers of iron and steel could not stay in business if a lower rate and a higher minimum were adopted. Commissioner Campbell asked Mr. Ross as to the practicability of adopting a split list, and the reply was that it should not be done.

Contents Valleys Are Handicapped on Eastbound Traffic

Shippers and receivers in the Mahoning and Shenango Valleys, with the exception of the Steel Corporation, were represented by H. D. Rhodehouse, traffic manager Youngstown Chamber of Commerce. He pointed out the disadvantage to that territory in reaching Trunk Line and New England territories as compared with competing districts such as Pittsburgh, Buffalo and others. He called attention to the glaring inequality in rates to the Baltimore group from Pittsburgh and from Youngstown. From Pittsburgh, the group extends north a short distance beyond Harrisburg, Pa., but as a destination group from Youngstown the group extends north into the State of New York. He objected to the rates from Youngstown to northern New York and New England on the ground that they are arbitrary over the rate to New York, which in turn was made an arbitrary of the Pittsburgh-New York rate. He drew many comparisons to prove his contentions of disadvantages to Youngstown, among these being the common rate of 21½c. to Kane, Pa., from both Youngstown and Wheeling, the distance from Youngstown being 155 miles and from Wheeling 222 miles. Rates from Youngstown to points in northern New York and New England, he said, were from ½c. to 2½c. higher than from Pittsburgh, Wheeling and Erie, and the distances from those points are frequently greater than from Youngstown.

New Mileage Scale Proposed

The hearing of May 17 opened with additional testimony by Mr. Rhodehouse on alleged rate disadvantages to Youngstown on westbound traffic to points in the southern peninsula of Michigan. With reference to destinations in that State, he said that rates from Youngstown, almost without exception, were based on mileages that were 7 miles in excess of the actual short-line distances, this giving to Cleveland a ½c. advantage. He showed that rates from Youngstown to points in southern Illinois and Indiana are in excess of the fifth-class rate and that in some cases rates on raw material are higher than on manufactured goods. Choosing as a basis the rate of 34c. from Pittsburgh to New York, he introduced a map to show the greatest distances that rate would carry traffic out of Youngs-

town and Pittsburgh. The gap between the two reached the maximum of 308 miles between Altoona and New York. He proposed a mileage scale for making rates in Official Classification territory, which began at 3c. per 100 lb. and increased $\frac{1}{4}$ c. for each 5 miles up to 150 miles, then $\frac{1}{2}$ c. for each 10 miles up to 250 miles, $\frac{1}{4}$ c. for each 15 miles up to 355 miles, $\frac{1}{2}$ c. for each 20 miles up to 455 miles, and finally $\frac{1}{4}$ c. for each 25 miles beyond that distance.

Says J. & L. Scale Penalizes Short-Haul Shippers

The Jones & Laughlin scale was used as a basis for comparison in testimony given by the Bethlehem Steel Co. for the reason that it is the only scale made by the commission applying on traffic over any considerable area of the territory involved. H. C. Crawford, traffic manager for that company, drew comparisons to show that rates from Eastern mills of his company to Eastern Trunk Line territory are a higher percentage of the Jones & Laughlin scale than are rates into that territory from Pittsburgh and Wheeling. He is opposed to a double minimum weight on the basis that it would be disadvantageous to small producers and buyers.

W. G. Oliver, appearing for the Bethlehem company, said that in a scale such as the Jones & Laughlin the spread between the rate of increase on long-haul traffic and the rate of increase on short-haul traffic was too great and that it penalized short-haul shippers. This was objectionable to counsel for the Steel Corporation and others, since they had contended that rates on long hauls are too high.

Ingot steel capacity in Official Classification territory in 1904 was said to have been 22,826,625 gross tons, while the figure for 1926 was given as 54,807,343 gross tons. Of the increase in the entire territory of 31,980,718 tons, 18,242,075 tons was in the Middle district. The capacity of the Steel Corporation was said to have been 21,180,300 gross tons in 1926, and that of the Bethlehem Steel Co., 7,600,000. W. S. Tower, statistician for the Bethlehem company, said that the Steel Corporation holds a dominant position and that this is growing more pronounced. His conclusion was that Middle district producers are well entrenched in Eastern markets and that Pittsburgh offers the greatest advantages as a location in which to engage in the production of iron and steel.

R. K. Keas, traffic manager Laclede Steel Co., St. Louis, said that of 125,000 tons of steel produced annually by his company only 25,000 tons is consumed

in the St. Louis market. As a result of the absence of a local market, he asserted, his company could not compete on the basis of the Jones & Laughlin scale. Cross-examination brought out the fact that the average shipments from the plants of this company moved approximately 400 miles and that the bulk of the tonnage was shipped from 160 miles and 550 miles and that therefore the Laclede Steel Co. is not much interested in rates up to 180 miles. Testimony by shippers was brought to a close, May 18.

Railroads Favor Fifth-Class Basis for Steel Rates

Central Freight Association carriers, represented by O. S. Lewis, freight traffic manager Baltimore & Ohio Railroad, Baltimore, said that they are in favor of the fifth class as the proper basis for iron and steel rates in the C. F. A. territory, and that for inter-territorial applications they advocated the fifth-class basis prescribed in the Eastern class rate case. Mr. Lewis stated that evidence showed that the fifth-class rates on iron and steel are not higher than the traffic will bear. It was brought out that in recent years there has been a tendency for non-integrated steel plants to consolidate, with the result that the carriers have been deprived of not less than \$2,500,000 annually in revenue.

Some railroads perform only delivery service in iron and steel. The Pere Marquette Railway, operating for the most part in Michigan, is a railroad in that classification. R. P. Paterson, assistant freight traffic manager Pere Marquette Railway, said that the application of the Jones & Laughlin scale would mean a serious curtailment of revenue and that in the case of his railroad the annual loss would amount to about \$360,000.

Trunk Line Carriers Propose New Mileage Scale

The Chicago hearing came to a close May 20, following a proposal by the Trunk Line carriers of a modified Jones & Laughlin scale to be applied in Trunk Line territory. The proposed scale would be the same as the Jones & Laughlin scale up to 70 miles. Then two blocks for which rates of 13c. and 14c. were repeated in the original Jones & Laughlin scale are taken out, thus resulting in an advance of 1c. over the original Jones & Laughlin scale from that point to where the proposed scale would meet the Jones & Laughlin scale, which is 560 miles. Beyond that distance the proposed scale of the Trunk Line carriers would be below that of the Jones & Laughlin scale.

Organization of Hot Rolled Strip Institute

The Hot Rolled Strip Institute, which has been formed with a membership of the leading producers of hot rolled strip steel, as announced in last week's issue, has completed its organization with the selection of an executive committee composed of E. T. Weir, president Weirton Steel Co., Weirton, W. Va.; H. T. Gilbert, vice-president Sharon Steel Hoop Co., Sharon, Pa.; F. J. Griffiths, chairman of the board, Central Alloy Steel Corporation, Massillon, Ohio; John Harrington, president Trumbull Steel Co., Warren, Ohio; E. J. Kulas, president Otis Steel Co., Cleveland, and James Kippincott, president West Leeburg Steel Co., Pittsburgh; George H. Charls, who has been appointed commissioner of the institute, will work under the direction of this executive committee.

The object of the institute will be to collect, compile and distribute among members information and statistics relating to the production, uses, sales of and demand for hot rolled strip steel. Other subjects that will be given attention will be manufacturing methods, freight classifications, trade extension, export possibilities and seasonal trends. Research work will be conducted to determine the quality, standards, grades and sizes in strip steel best suited for various products and parts.

Mr. Charls, the commissioner, was formerly vice-president and general manager and later president and general manager of the United Alloy Steel Corporation, Canton, Ohio, leaving that organization at the time of its merger last year with the Central Steel Co., under

the name of the Central Alloy Steel Corporation. He became associated with the Canton company about seven years ago as general manager of the Berger Mfg. Co., one of the units of the United Steel Co., and when this company, the Berger company and the United Furnace Co. were merged in 1921, he was made vice-president and general manager of the new company. He went to the Canton company from the American Rolling Mill Co., Middletown, Ohio, of which he was general manager of sales. He will maintain his office as commissioner of the Hot Rolled Strip Institute at Canton.

Change Date for Hearing on New England Steel Rates

WASHINGTON, May 24.—The date of hearings on the proposal of the railroads to establish fourth-class rates in place of commodity rates on iron and steel products in less than carloads in New England territory has been changed by the Interstate Commerce Commission and set for June 27 at the United States Court rooms, Boston, before Examiner Disque. Previously the hearing had been set for June 10 at New York.

Officers of New York Electrochemists

New officers of the New York section of the American Electrochemical Society for 1927-1928 were elected May 13 as follows: Chairman, C. L. Mantell, Pratt Institute, Brooklyn; secretary, F. F. Farnsworth, Bell Telephone Laboratories, New York.

Iron and Steel Markets

No Last Half of Month Activity

End of May Not Showing Usual Buying—Marked Handicap
of Warehouse Size Orders—Production Remains
High—Lack of Interest in Pig Iron

MAY has not shown, as have all recent months, a decided increase in buying on the turn into the last half. As yet the recession from April gives signs of being slight as compared with the decline in April from March. Production has been slowed up but little, but instead matches closely the large volume of specifications which round out each uncertain week.

Several measures of the status of the steel market were afforded by figures given to the American Iron and Steel Institute by Chairman Gary of the United States Steel Corporation. Shipments of the corporation for the year to date represented over 87 per cent of capacity. Bookings, which were over 8 per cent ahead of the same period last year, were a call on 77 per cent. Shipments for the first half of May were 47,768 tons per day, or slightly more than the average of the 4½ months. Bookings in May, meanwhile, had dropped to 30,133 tons, or 55 per cent, of capacity, compared with 30,300 tons in the same period of May, 1926. Both bookings and shipments compared favorably with the like period of 1926, but May, a year ago, when compared with April, showed a slight increase in new business, while this year there is an apparent falling off from April of over 20 per cent.

It is becoming increasingly clear that miscellaneous unclassified uses for steel are in the aggregate taking added tonnages that are almost sufficient to offset the losses in the leading channels of consumption, such as the railroads, automobiles, the oil industry and agriculture. A sustained demand in steel bars comes from many small users, and consumption of sheets is keeping some makers at an 85 and even 90 per cent. scale of operations.

The handicap of scheduling mills on orders of warehouse proportions is expected to continue until the opening of fall demand. Prices promise to be held well in the intervening relatively slow period on the score that little business can be developed by cuts and that a fair volume at a small margin of profit is better than a larger volume at a doubtful profit or none at all.

Little change in the rate of operations has occurred except in the Pittsburgh region, where steel ingot production is by 2 points closer to a 70 per cent basis than a week ago.

In pig iron there is a lack of interest in third quarter requirements and current buying is limited. Shipping orders from the automobile industry are beginning to slow down, suggesting a summer slump, although the order of a leading motor car

company, which has expanded its foundry capacity, is for increased requirements up to 50,000 tons for one year. Some steel foundries, benefitting from railroad equipment orders, report an improvement in business. In the Philadelphia district three sales of low phosphorus iron totaled 4800 tons. At Pittsburgh there continues to be pressure to sell basic iron at the expense of prices.

Purchases of 20,000 tons of scrap by a Pittsburgh district steel company and of 6000 tons by a Cleveland steel works failed to strengthen prices, which are weak in all markets. A year ago when heavy melting steel reached \$15.50 at Pittsburgh, it marked the end of a decline. Although the same price prevails today, the trade is not convinced that bottom has been reached. Dealers hesitate to place scrap on the ground and consumers await developments.

In the face of sharp curtailment of coke production, available spot supplies are more than ample to satisfy the demand.

Structural steel contracts reported in the week will take 26,000 tons of steel and new projects pending, 16,000 tons, the latter including 6100 tons for an athletic club in New York and 4500 tons for two New York school buildings.

Railroad equipment buying consisted mainly of 500 box cars for the Delaware, Lackawanna & Western. Orders for 4500 freight cars for the Illinois Central are expected soon.

Concrete reinforcing steel awards totaled 6500 tons and 7600 tons appeared in new projects under negotiation.

Bookings of commercial steel castings reported in April were 5 per cent off in tonnage from March, while those of malleable castings were 5 per cent more than March.

The recent reduction of ferromanganese from \$100 to \$95, seaboard, having failed to produce business for the English makers, offers of \$90 have been made. Domestic producers have first half contracts with their customers, protecting against a decline.

Exports of iron and steel in April increased and imports declined, according to Government statistics. The total exported was 192,339 tons, compared with 171,094 tons in March, while imports were 60,374 tons against 61,872 tons in March. An exportation of 24,393 tons of scrap accounted for some of the export gain last month.

Both of THE IRON AGE composite prices remain at last week's levels, that for pig iron at \$19.07 a ton and that for finished steel at 2.367c. a lb.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron,	May 24, 1927	May 17, 1927	Apr. 26, 1927	May 25, 1926
No. 2, fdy., Philadelphia...	\$21.76	\$21.76	\$21.76	\$22.26
No. 2, Valley furnace.....	18.50	18.50	18.50	18.50
No. 2, Southern, Cin'ti....	21.69	21.69	21.69	25.69
No. 2, Birmingham.....	18.00	18.00	18.00	22.00
No. 2 foundry, Chicago*...	20.00	20.00	20.00	21.50
Basic, del'd eastern Pa....	20.75	20.75	20.75	21.75
Basic, Valley furnace.....	18.00	18.00	19.00	18.00
Valley Bessemer, del'd P'gh	20.76	20.76	21.26	20.76
Malleable, Chicago*.....	20.00	20.00	20.00	21.50
Malleable, Valley.....	18.50	18.50	18.50	18.50
Gray forge, Pittsburgh....	19.76	19.76	19.76	19.76
L. S. charcoal, Chicago....	27.04	27.04	27.04	29.04
Ferromanganese, furnace.	95.00	95.00	100.00	88.00

Rails, Billets, etc., Per Gross Ton:

O.-h. rails, heavy, at mill.	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	34.00
Bess. billets, Pittsburgh...	33.00	33.00	33.00	35.00
O.-h. billets, Pittsburgh...	33.00	33.00	33.00	35.00
O.-h. sheet bars, P'gh.....	33.50	34.00	34.00	36.00
Forging billets, P'gh.....	39.00	39.00	40.00	40.00
O.-h. billets, Phila.....	39.30	39.30	39.30	40.30
Wire rods, Pittsburgh....	42.00	42.00	42.00	45.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.80	1.90	1.90	1.90

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.12	2.12	2.12	2.22
Iron bars, Chicago.....	2.00	2.00	2.00	2.00
Steel bars, Pittsburgh...	1.85	1.85	1.85	1.90
Steel bars, Chicago.....	2.00	2.00	2.00	2.10
Steel bars, New York.....	2.19	2.19	2.19	2.24
Tank plates, Pittsburgh...	1.85	1.85	1.85	1.85
Tank plates, Chicago.....	2.00	2.00	2.00	2.10
Tank plates, New York....	2.19	2.19	2.19	2.24
Beams, Pittsburgh.....	1.80	1.80	1.80	1.90
Beams, Chicago.....	2.00	2.00	2.00	2.10
Beams, New York.....	2.14	2.14	2.14	2.24
Steel hoops, Pittsburgh...	2.30	2.30	2.30	2.50

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Sheets, Nails and Wire,	May 24, 1927	May 17, 1927	Apr. 26, 1927	May 25, 1926
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.90	2.90	2.70	3.00
Sheets, black, No. 24, Chi-				
cago dist. mill.....	3.10	3.10	2.95	3.20
Sheets, galv., No. 24, P'gh	3.75	3.75	3.60	3.95
Sheets, galv., No. 24, Chi-				
cago dist. mill.....	3.95	3.95	3.85	4.15
Sheets, blue, 9 & 10, P'gh	2.25	2.25	2.15	2.40
Sheets, blue, 9 & 10, Chi-				
cago dist. mill.....	2.35	2.35	2.35	2.60
Wire nails, Pittsburgh....	2.50	2.50	2.55	2.65
Wire nails, Chicago dist.				
mill.....	2.55	2.55	2.60	2.70
Plain wire, Pittsburgh....	2.40	2.40	2.40	2.50
Plain wire, Chicago dist.				
mill.....	2.45	2.45	2.45	2.55
Barbed wire, galv., P'gh..	3.20	3.20	3.25	3.35
Barbed wire, galv., Chi-				
cago dist. mill.....	3.25	3.25	3.30	3.40
Tin plate, 100 lb. box, P'gh	\$5.50	\$5.50	\$5.50	\$5.50

Old Material, Per Gross Ton:

Carwheels, Chicago.....	\$13.75	\$14.25	\$14.75	\$15.00
Carwheels, Philadelphia...	15.00	16.00	16.00	17.00
Heavy melting steel, P'gh..	15.50	15.50	16.00	15.50
Heavy melting steel, Phila.	14.00	14.00	14.50	15.00
Heavy melting steel, Ch'go	12.25	12.25	13.00	12.00
No. 1 cast, Pittsburgh....	15.50	15.75	16.00	16.50
No. 1 cast, Philadelphia...	16.50	17.00	17.00	17.00
No. 1 cast, Ch'go (net ton)	15.50	16.00	16.50	15.75
No. 1 RR. wrot, Phila....	16.50	16.50	16.50	17.00
No. 1 RR. wrot, Ch'go (net)	11.00	11.50	12.25	10.50

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt....	\$2.90	\$2.90	\$3.15	\$2.85
Foundry coke, prompt....	4.00	4.00	4.00	4.00

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	12.87 1/2	13.12 1/2	13.25	14.00
Electrolytic copper, refinery	12.43	12.75	12.87 1/2	12.57 1/2
Zinc, St. Louis.....	6.07 1/2	6.00	6.10	6.85
Zinc, New York.....	6.42 1/2	6.35	6.45	7.20
Lead, St. Louis.....	6.15	6.30	6.57 1/2	7.40
Lead, New York.....	6.50	6.65	6.87 1/2	7.65
Tin (Stralts), New York...	67.75	67.00	66.75	61.00
Antimony (Asiatic), N. Y.	13.50	12.50	14.75	9.50

Pittsburgh

Recession in Steel Demand Gradual— Ingot Output at 70 Per Cent

PITTSBURGH, May 24.—The steel market continues to grow less active, and yet it is making a good showing for this season in comparison with other recent years. Since a week ago a merchant blast furnace has stopped making iron, but no additions to the idle list of steel works stacks are noted and steel ingot production, at 70 per cent of capacity in this and nearby districts, is down only about two points from the rate of last week. There has been nothing precipitate about the recession from first quarter activity. The decline in business since last month has been slight compared with the April drop from the March rate.

In not a few finished products orders and specifications this month have been substantially as large as in April. The significant change that has taken place in the market in the past month or so is that buying is at shorter range and that mill scheduling has become more difficult, since in the heavy rate of production during the first three and one-half months of the year the mills exhausted backlog business. It is this situation that accounts for the anxiety for orders and the increasingly common comment that prices are highly competitive. Buyers still control the situation as to prices, and it is not necessary to qualify that statement in the face of the close adherence by mills to the advances recently set up in sheets and cold-rolled strips, because to a large extent those advances are yet to have their real test.

Major consuming industries, as a rule, are taking

less steel than they did recently, but still they are taking a good deal when it is considered that inventories get more attention than in former years and that the checking of stocks and requirements is now a seasonal rather than an annual event. The big users of steel are now making such a check, but they are finding that they need additional supplies and are furnishing considerable miscellaneous tonnages, while the unclassified consuming industries seem to be taking no backward step either in the sale of finished products or in ordering their steel requirements.

Expressions regarding business prospects for June, in the main, are optimistic, and some mills believe that orders, specifications and production will not run materially lower than this month. There is the expectation that the requirements of the Ford and Dodge companies will in a measure offset any falling off in tonnage in the between-models period from other motor car builders. The market has discounted the situation in the oil industry and derives some encouragement from the advance in cotton as a possible business stimulus in the South. Railroad buying is disappointing, but a counterbalancing factor is the report that the steel fabricators are very busy in their engineering departments.

There is almost no demand for pig iron, and except for one good-sized sale, the scrap market has developed nothing that is interesting or that gives a cue to what is ahead. Curtailment of coke production has been drastic, but spot supplies are more than ample for the demand. Meanwhile the suspension of union coal mines remains a negative factor in the coal market, which, while a little more active than recently, still is weak under heavy offerings in comparison with the requirements.

Pig Iron.—The market has been slightly stirred by

reports that a Pittsburgh district steel maker recently bought a tonnage of basic iron at the equivalent of \$17 at Valley furnace. There is little disposition to doubt that such a price was made, because there are some steel companies that have stocks well in excess of their immediate needs and have a lower rate of freight to Pittsburgh district destinations than have the Valley furnaces. Moreover, to get virtually the Valley furnace price at their own furnaces has been tempting, especially when there has been a desire to reduce inventories. Valley furnaces are still quoting this grade at \$18, but except for one or two small lots, no business is being done. Bessemer iron at \$19, Valley furnace, also is untested by large inquiries. The market is holding well at \$18.50, Valley furnace, for No. 2 foundry, and if sales of this are small, there is a very steady movement against old orders. The Clinton Iron & Steel Co., Pittsburgh, this week took off its blast furnace. There are now 77 out of 126 furnaces in this and nearby districts in production, or about seven fewer than at the peak reached in March.

Prices per gross ton f.o.b. Valley furnace:

Basic	\$18.00
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	18.50
Low phosphorus, copper free.....	28.00

Freight rate to the Pittsburgh or Cleveland district, \$1.76.

Ferroalloys.—Since most of the important users of ferromanganese are now covered for the remainder of the year, business has become largely a matter of specifications, and this will be the condition until late in the year, when 1928 requirements come up for consideration, unless in the meantime there is a decline in prices. The terms of the contracts of American producers give an outright guarantee against a decline in prices, or permit the buyer to cancel if supplies can be bought elsewhere for less than the contract price. A little last half spiegeleisen business is being written at the same prices as on first half contracts, starting at \$37 for small tonnages and working down several dollars from that price for larger tonnages. Spot demands are few and small and are easily supplied from tonnages released by contract buyers. Consumption of all of the commonly used ferroalloys has receded from the rate of the forepart of the year in keeping with the decline in steel production.

Fluorspar.—Consumers of gravel spar are buying in close step with their actual requirements, and all orders are small and for very prompt shipment. One sale of 200 tons of domestic spar is reported at \$18, mines, but as a rule the orders are for smaller tonnages. The larger domestic producers are quoting that price, but \$17 is still acceptable to the smaller ones. Foreign spar continues to be offered well under the price of domestic material but is not selling at all freely in this and nearby districts.

Semi-Finished Steel.—No material improvement is noted in the demand for billets, slabs and sheet bars, and as the non-integrated manufacturers of sheets, tin plate and strips see no greater demand for their products for the coming month than for this month, June orders, if anything, are a little smaller than

those for this month. June business in sheet bars, in a few cases, will carry a price of \$34, Pittsburgh or Youngstown, but in more instances and on more tonnage, \$33.50. There is, however, some talk of an advance of \$1 or \$1.50 a ton in sheet bars to become effective on tonnages for shipment after June 30. Such a move would be logical in view of the effort of the large sheet producers, most of whom also sell sheet bars, to fully establish the recent advances in sheet prices. On large billets and slabs, \$33, Pittsburgh or Youngstown, is all that can be done. Only small tonnages of wire rods are selling at more than \$42, base, Pittsburgh or Cleveland, while skelp now takes the same price range as plates, or 1.80c. to 1.90c.

Wire Products.—Makers in this district have not abandoned the effort to maintain \$2.55, base per keg, Pittsburgh, on nails and recent prices on staples and barbed wire, and have had a measure of success in securing orders within the Pittsburgh district. But salesmen still have the authority to meet competition to retain regular customers, and on a tonnage basis \$2.50 is the prevailing price. Plain wire and the products with prices based on the plain wire quotation are holding well. Business has had some recession from its recent volume, but it is still ahead of that of 12 months ago.

Rails and Track Supplies.—This is usually a quiet period in these products, and this year is no exception to the rule. Order books are shrinking steadily as shipments are running well ahead of new business. Prices are steady, but untested.

Tubular Goods.—Line-pipe business is still the backbone of the tubular goods market, because bookings in standard-weight pipe are running about 10 per cent smaller than a year ago and there has been an even greater shrinkage in the movement of oil well pipe, owing to curtailed drilling operations forced by low oil prices, which, in turn, are a result of overproduction, notably in the Seminole, Okla., field. There are reports of price shading on seamless casing, but generally makers are holding to prices on the theory that lower quotations will not create business. Observation of quotations is close on welded pipe of all descriptions. Boiler tubes are selling fairly well, but competition is still sharp.

Sheets.—Makers continue to take a stronger stand on prices, and buyers are now finding it hard to interest them in orders at less than 2.90c., base Pittsburgh, for black, 3.75c., base, on galvanized and 2.25c., base, on blue annealed sheets. Some of the larger producers, having in mind the full establishment of the advances announced late in April on third quarter business and having fair-sized order books, are refusing business at less than 3c., 3.85c. and 2.25c. respectively. Some business is being booked at those prices, and some automobile body sheet business also is reported at the higher price announced three weeks ago. The real test of the advances, however, is still ahead, as there were few mills, if any, that did not give buyers a chance to place tonnage before the higher prices went into effect and such coverage carried at least through the month of June. Mill operations are averaging approximately 75 per cent of capacity.

THE IRON AGE Composite Prices

Finished Steel

May 24, 1927, 2.367c. a Lb.

One week ago.....	2.367c.
One month ago.....	2.339c.
One year ago.....	2.403c.
10-year pre-war average.....	1.689c.

Based on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 87 per cent of the United States output of finished steel.

High		Low	
1927	2.453c.	Jan. 4:	2.339c.
1926	2.453c.	Jan. 5:	2.403c.
1925	2.560c.	Jan. 6:	2.396c.
1924	2.789c.	Jan. 15:	2.460c.
1923	2.824c.	April 24:	2.446c.
		April 26	
		May 18	
		Aug. 18	
		Oct. 14	
		Jan. 2	

Pig Iron

May 24, 1927, \$19.07 a Gross Ton

One week ago.....	\$19.07
One month ago.....	19.21
One year ago.....	20.46
10-year pre-war average.....	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High		Low	
1927	\$19.71.	Jan. 4:	\$13.96.
1926	21.54.	Jan. 5:	19.46.
1925	22.50.	Jan. 13:	18.96.
1924	22.88.	Feb. 26:	19.21.
1923	30.86.	March 20:	20.77.
		Feb. 15	
		July 13	
		July 7	
		Nov. 3	
		Nov. 20	

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base Per Lb.
Pittsburgh mills.....	1.85c. to 1.90c.
Chicago.....	2.00c. to 2.10c.
Philadelphia.....	2.17c. to 2.22c.
New York.....	2.19c. to 2.24c.
Cleveland.....	2.09c.
Cleveland.....	1.85c. to 1.90c.
Birmingham.....	2.05c. to 2.15c.
Pacific ports.....	2.35c.
San Francisco mills.....	2.35c. to 2.40c.

Billet Steel Reinforcing

Pittsburgh mills.....	1.90c.
Birmingham.....	2.00c.

Rail Steel

mill.....	1.70c. to 1.80c.
Chicago.....	1.90c. to 2.00c.

Iron

Common iron, f.o.b. Chicago.....	2.00c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base Per Lb.
Pittsburgh mill.....	1.80c. to 1.90c.
Chicago.....	2.00c.
Birmingham.....	1.95c. to 2.05c.
Cleveland.....	2.09c.
Philadelphia.....	2.12c. to 2.22c.
New York.....	2.14c. to 2.24c.
Pacific ports.....	2.25c. to 2.30c.

Structural Shapes

	Base Per Lb.
Pittsburgh mills.....	1.80c. to 1.90c.
Chicago.....	2.00c.
Birmingham.....	2.05c. to 2.15c.
Cleveland.....	2.09c.
Philadelphia.....	2.07c. to 2.22c.
New York.....	2.09c. to 2.24c.
Pacific ports.....	2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

	Base Per Lb.
Gages, narrower than 6 in., P'gh.....	2.30c.
Gages, 6 in. to 12 in., P'gh.....	2.10c.
Gages, 13 and 14 gage, 12 in. to 14 in., P'gh.....	2.30c.
Gages, 15 and 16 gage, 12 in. to 14 in., P'gh.....	2.40c.
Gages, narrower than 6 in., Chicago.....	2.40c. to 2.60c.
Gages, 6 in. and wider, Chicago.....	2.30c. to 2.50c.

*Mills follow plate or sheet prices according to gage on wider than 14 in.

Cold-Finished Steel

	Base Per Lb.
Bars, f.o.b. Pittsburgh mills.....	2.40c.
Bars, f.o.b. Chicago.....	2.40c.
Bars, Cleveland.....	2.35c.
Shafting, ground, f.o.b. mill.....	2.55c. to 3.00c.
Strips up to 12 in., f.o.b. Pittsburgh mill.....	3.00c. to 3.25c.
Strips up to 12 in., f.o.b. Cleveland mills.....	3.00c. to 3.25c.
Strips up to 12 in., delivered Chicago.....	3.30c. to 3.55c.
Strip sheets, 12 in. and wider, Pittsburgh mill.....	3.00c.
Strip sheets, 12 in. and wider, Cleveland mill.....	3.00c.
Strip sheets, 12 in. and wider, Chicago mill.....	3.30c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)

	Base Per Keg
Wire nails.....	\$2.50 to \$2.55
Galv'd nails.....	4.50 to 4.55
Galvanized staples.....	3.20 to 3.25
Polished staples.....	2.95 to 3.00
Cement coated nails.....	2.50 to 2.55

Base Per 100 Lb.

Bright plain wire, No. 9 gage.....	\$2.40
Annealed fence wire.....	2.55
Spring wire.....	3.40
Galv'd wire, No. 9.....	3.00
Barbed wire, galv'd.....	\$3.20 to 3.25
Barbed wire, painted.....	2.95 to 3.00

Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass., mill \$3 a ton higher on production of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.

Woven Wire Fence

	Base to Retailers Per Net Ton
F.o.b. Pittsburgh.....	\$65.00
F.o.b. Cleveland.....	65.00
F.o.b. Anderson, Ind.....	66.00
F.o.b. Chicago district mills.....	67.00
F.o.b. Duluth.....	68.00
F.o.b. Birmingham.....	68.00

Sheets

Blue Annealed

	Base Per Lb.
Nos. 9 and 10, f.o.b. Pittsburgh.....	2.25c.
Nos. 9 and 10, f.o.b. Chicago dist. mill.....	2.35c.
Nos. 9 and 10, del'd Philadelphia.....	2.57c.
Nos. 9 and 10, f.o.b. Birmingham.....	2.35c. to 2.45c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.90c. to 3.00c.
No. 24, f.o.b. Ch'go dist. mill.....	3.10c.
No. 24, del'd Philadelphia.....	3.22c. to 3.32c.
No. 24, f.o.b. Birmingham.....	3.10c. to 3.15c.

Metal Furniture Sheets

No. 24, f.o.b. Pittsburgh, A grade.....	4.00c. to 4.10c.
No. 24, f.o.b. Pittsburgh, B grade.....	3.90c. to 4.00c.

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.75c. to 3.85c.
No. 24, f.o.b. Chicago dist. mill.....	3.95c.
No. 24, del'd Philadelphia.....	4.07c. to 4.17c.
No. 24, f.o.b. Birmingham.....	3.95c. to 4.05c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	3.10c.
No. 28, f.o.b. Chicago dist. mill.....	3.20c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.15c. to 4.25c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	4.20c. to 4.30c.
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Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.50
Standard cokes, f.o.b. Gary and Elwood, Ind.....	5.60

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per package, 20 x 28 in.)

8-lb. coating, 100.....	20-lb. coating I.C. \$16.20
lb. base.....	\$11.40
25-lb. coating I.C.....	17.90
8-lb. coating I.C. 11.70.....	30-lb. coating I.C. 19.45
15-lb. coating I.C. 14.85.....	40-lb. coating I.C. 21.65

Alloy Steel Bars

(F.o.b. Pittsburgh or Chicago)

S. A. E. Series	Numbers	Base Per 100 Lb.
2100* (½% Nickel, 0.10% to 0.20% Carbon)		\$3.00 to \$3.15
2300 (3½% Nickel)		4.30 to 4.40
2500 (5% Nickel)		5.50
3100 (Nickel Chromium)		3.30 to 3.40
3200 (Nickel Chromium)		4.75 to 5.00
3300 (Nickel Chromium)		7.00 to 7.25
3400 (Nickel Chromium)		6.25 to 6.50
5100 (Chromium Steel)		3.30 to 3.40
5200* (Chromium Steel)		7.00 to 7.50
6100 (Chrom. Vanadium bars)		4.20 to 4.30
6100 (Chrom. Vanad. spring steel)		3.50
9250 (Silicon Manganese spring steel)		3.20 to 3.25
Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.)		4.10 to 4.20
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.)		4.20 to 4.30
Chromium Molybdenum bars (0.80—1.10 Chrom., 0.25—0.40 Molyb.)		4.25 to 4.35
Chromium Molybdenum bars (0.50—0.70 Chrom., 0.15—0.25 Molyb.)		3.40 to 3.50
Chromium Molybdenum spring steel (1—1.25 Chrom., 0.30—0.50 Molybdenum)		4.50 to 4.75

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 in. down to and including 2½-in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specification, but numbered by manufacturers to conform to S. A. E. system.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	\$36.00 to 38.00

Track Equipment

(F.o.b. Mill)

Base Per 100 Lb.

Spikes, ½ in. and larger.....	\$2.80 to \$3.00
Spikes, ½ in. and smaller.....	2.80 to 3.15
Spikes, boat and barge.....	3.25
Tie plates, steel.....	2.85
Angle bars.....	2.75
Track bolts, ½ in. and ¾ in.....	3.90 to 4.00
Track bolts, ¾ in. and smaller, per 100 count.....	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
1½.....	45	19½	1½ to ¾.....	+11	+39
1½ to ¾.....	51	25½	¾.....	22	2
¾.....	56	42½	¾.....	28	11
¾.....	60	48½	1 to 1½.....	30	18
1 to 3.....	62	50½			

Lap Weld

2.....	55	43½	2.....	23	7
2½ to 5.....	59	47½	2½.....	26	11
7 and 8.....	56	43½	3 to 6.....	28	18
9 and 10.....	54	41½	7 to 12.....	26	11
11 and 12.....	53	40½			

Butt Weld, extra strong, plain ends

1½.....	41	24½	1½ to ¾.....	+19	+64
1½ to ¾.....	47	30½	¾.....	21	17
¾.....	53	42½	¾.....	28	12
¾.....	58	47½	1 to 1½.....	30	14
1 to 1½.....	60	49½			
2 to 3.....	61	50½			

Lap Weld, extra strong, plain ends

2.....	53	42½	2.....	23	9
2½ to 4.....	57	46½	2½ to 4.....	29	15
4½ to 6.....	56	45½	4½ to 6.....	28	14
7 to 8.....	52	39½	7 to 8.....	21	15
9 and 10.....	45	32½	9 to 12.....	16	2
11 and 12.....	44	31½			

To the large jobbing trade the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to large jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel	Charcoal Iron
2 to 2½ in.....	27 1½ in.....+18
2½ to 3 in.....	37 1½ to 1¾ in.....+8
3 in.....	46 2 to 2½ in.....—2
3½ to 4 in.....	42 2½ to 3 in.....—7
4 to 13 in.....	46 3½ to 4½ in.....—9

Beyond the above discounts, 7 fires extra are given on lap welded steel tubes and 2 tens to 2 tens and 1 five on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.....	60	3 in.....	45
1½ to 1¾ in.....	52	3½ to 3¾ in.....	47
1¾ in.....	34	4 in.....	50
2 to 2½ in.....	39	4½, 5 and 6 in.....	45
2½ to 3 in.....	31		

Hot Rolled

2 and 2½ in.....	37	3½ and 3¾ in.....	53
2½ and 2¾ in.....	45	4 in.....	54
3 in.....	51	4½, 5 and 6 in.....	51

Less carloads, 4 points less. Add 38 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tubes list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base.....	85
Carbon, 0.30% to 0.40%, base.....	50
Plus differentials for lengths over 16 ft. and for commercially exact lengths. Warehouse discounts on small lots are less than the above.	

Tin Plate.—The market is quiet, but such business as is developing discloses a stronger price stand on the part of producers and a more determined effort to place small-tonnage business at \$5.50 per base box, Pittsburgh, and to reduce preferentials to larger consumers. On no small part of the business of consumers who are not regarded as the customers of any one mill, there was enough competition for the orders to place these buyers practically on a price parity with the very largest users of tin plate and in one case on a materially lower base. Last half business does not yet amount to much, but the little placed has been based upon \$5.50, Pittsburgh. There is no longer much doubt that the requirements for packers' cans will be well under those of last year, as a good many Central Western canneries will be kept idle this year in an effort to reduce the surplus of canned corn and peas. General line can requirements promise to be as large this year as last, and the year's shipments will be smaller to the extent of the loss of export business and the decrease in the requirements for corn and peas.

Cold-Finished Steel Bars and Shafting.—Most makers have opened books for third quarter business and are naming 2.40c., base Pittsburgh, on small-lot tonnages. June gives indications of being a quiet month, as shipments are exceeding new business and order books are growing slimmer.

Hot-Rolled Strips.—This month's orders and specifications in strips have not varied materially from those of last month, which showed a decline from the previous month of about 25 per cent for makers in this district. Consumers generally are drawing against orders placed before prices were advanced late in February, and the real test of present prices will come with third quarter business. Makers of hoop and band steel have rather small order books, and new business does not amount to much.

Cold-Rolled Strips.—On such tests as have been given the new prices, they have held. One lot of 100 tons to a motor car builder is reported as having commanded the full price of 3.25c., base, for 1 to 3 tons, or for the tonnage bought, under the quantity differentials, 3c. There is a strong effort to establish the third quarter market at this level.

Steel and Iron Bars.—Business in steel bars reaches a fairly satisfactory total despite the fact that it is made up of numerous small lots wanted promptly. It is impossible for makers to accumulate much business, and rolling schedules have never before been shorter. Small-lot buyers in the Pittsburgh district are not getting lower prices than 1.90c., base Pittsburgh, concessions going to buyers in competitive consuming districts. The price for preferred buyers has been under 1.90c., base, since early in the year. Iron bars are still quoted at 2.75c., base, but that is a small rather than a large-lot figure.

Structural Steel.—New business is not compensating for completed orders, and the trend of mill operations is down, with schedules more dependent than recently upon current demands. These are fairly numerous but call for small tonnages, on which the

mills are not having much trouble in maintaining 1.90c., base Pittsburgh, within the Pittsburgh district but are not so successful on shipments outside that territory. Some of the fabricating shops are busy, but others need orders. All are busy in their drawing rooms, and all report highly competitive prices on structural jobs up for bids.

Plates.—There has been no change from the recent price range of 1.80c. to 1.90c., base Pittsburgh, but the higher figure is obtainable only on small lots and then for nearby shipments.

Coke and Coal.—The spot furnace coke market is still weak, for while there has been a sharp curtailment of output by Connellsville producers and those who are still operating want \$3 per net ton at ovens on fresh drawings, a good deal of coke was loaded on cars by producers who were banking their ovens and these tonnages are being offered at as low as \$2.75. There is not enough demand from either pig iron producers or other users of this grade to fully absorb what would ordinarily be considered a scant supply. Some preliminary negotiations have been started on third quarter contracts, but as usual buyers and sellers are far apart on prices. Blast furnace operators seem to think that in view of the uncertain pig iron market it would be risky for them to pay more than \$3, while on the basis of present wage scales, coke producers want \$3.25 to \$3.50. Spot foundry coke is still quotable at \$4 to \$4.50, with special brands held at \$5 to \$5.50 for either spot or third quarter shipment. Stocks of coal are too heavy for the market to show any real activity.

Old Material.—There is no occasion materially to change prices from those of a week ago, but the tone of the market is no stronger than it has been, despite a purchase by a Pittsburgh district steel company in the past week estimated at 20,000 to 25,000 tons of heavy melting steel and compressed and bundled sheets at \$15.50, \$14.50 and \$13.50 respectively. Ordinarily, a sale of this size would give the market some support in the shape of a short interest that required covering, but those who shared in this business either have the tonnage in sight or have ample time in which to ship it. Other mills in the district are uninterested, and in the Youngstown district, steel makers seem more disposed to liquidate than add to their stocks. A year ago, when heavy melting steel reached \$15.50, it marked the end of a decline, but this year the common belief is that the market will break through that level and the inclination of those who are regarded as bargain hunters among consumers of scrap is to wait and see if it does.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Furnace Grades:	
Heavy melting steel.....	\$15.50
Scrap rails	15.00
Compressed sheet steel.....	14.50
Bundled sheets, sides and ends...	13.50
Cast iron car wheels.....	\$15.50 to 16.00
Sheet bar crops, ordinary.....	16.00 to 16.50
Heavy breakable cast.....	14.50 to 15.00
No. 2 railroad wrought.....	14.00 to 14.50
Heavy steel axle turnings.....	14.00 to 14.50
Machine shop turnings.....	11.00 to 11.50

Acid Open-Hearth Furnace Grades:	
Railroad knuckles and couplers...	18.00 to 18.50
Railroad coil and leaf springs...	18.00 to 18.50
Roller steel wheels.....	18.00 to 18.50
Low phosphorus billet and bloom ends	20.00 to 20.50
Low phosphorus, mill plate.....	19.50 to 20.00
Low phosphorus, light grade.....	17.00 to 17.50
Low phosphorus sheet bar crops.....	19.00 to 19.50
Heavy steel axle turnings.....	14.00 to 14.50

Electric Furnace Grades:	
Low phosphorus punchings.....	18.50 to 19.00
Heavy steel axle turnings.....	14.00 to 14.50

Blast Furnace Grades:	
Short shoveling steel turnings...	11.00 to 11.50
Short mixed borings and turnings	11.00 to 11.50
Cast iron borings.....	11.00 to 11.50
No. 2 busheling.....	11.00 to 11.50

Rolling Mill Grades:	
Steel car axles.....	20.50 to 21.00
No. 1 railroad wrought.....	12.50 to 13.00

Cupola Grades:	
No. 1 cast.....	15.50 to 16.00
Rails 3 ft. and under.....	18.00 to 18.50

Malleable Grades:	
Railroad	15.50
Industrial	15.00
Agricultural	14.50

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes.....	2.90c.
Reinforcing steel bars.....	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.60c.
Squares and flats.....	4.10c.
Bands	3.60c. to 3.65c.
Hoops	4.00c. to 4.50c.
Black sheets (No. 24 gage), 25 or more bundles	3.75c.
Galvanized sheets (No. 24 gage), 25 or more bundles	4.60c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.30c.
Spikes, large	3.30c. to 3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, ½ in. and smaller, per 100 count, 62½ per cent off list	
Machine bolts, per 100 count, 62½ per cent off list	
Carriage bolts, per 100 count, 62½ per cent off list	
Nuts, all styles, per 100 count, 62½ per cent off list	
Large rivets, base per 100 lb.	\$3.50
Wire, black soft annealed, base per 100 lb.	2.90
Wire, galvanized soft, base per 100 lb.	2.90
Common wire nails, per keg.....	2.90
Cement coated nails, per keg.....	2.95

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms	Per Gross Ton
Revolving, 4-in. and over.....	\$33.00
Revolving, under 4-in. to and in- cluding 1½-in.	\$33.50 to 34.00
Forging, ordinary	39.00 to 40.00
Forging, guaranteed	44.00 to 45.00

Sheet Bars	Per Gross Ton
Open-hearth or Bessemer.....	\$33.50 to \$34.00

Slabs	Per Gross Ton
8 in. x 2 in. and larger.....	\$33.00
Smaller than 8 in. x 2 in.	\$33.50 to 34.00

Skelp	Per Lb.
Grooved	1.80c. to 1.90c.
Sheared	1.80c. to 1.90c.
Universal	1.80c. to 1.90c.

Wire Rods	Per Gross Ton
*Common soft, base.....	\$42.00 to \$43.00
Screw stock	\$5.00 per ton over base
Carbon 0.20% to 0.40%	3.00 per ton over base
Carbon 0.41% to 0.55%	5.00 per ton over base
Carbon 0.56% to 0.75%	7.50 per ton over base
Carbon over 0.75%	10.00 per ton over base
Acid	15.00 per ton over base

*Chicago mill base is \$42.50 to \$44. Cleveland mill base, \$42 to \$43.

Prices of Raw Materials

Ores	Per Gross Ton
Lake Superior Ores, Delivered Lower Lake Ports	
Old range Bessemer, 51.50% iron.....	\$4.55
Old range non-Bessemer, 51.50% iron.....	4.40
Mesabi Bessemer, 51.50% iron.....	4.40
Mesabi non-Bessemer, 51.50% iron.....	4.25
High phosphorus, 51.50% iron.....	4.15
Foreign Ore, c.i.f. Philadelphia or Baltimore	
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria.....	10.50c.
Iron ore, Swedish, average 66% iron, 9.75c. to 10.00c.	
Manganese ore, washed, 52% manganese, from the Caucasus.....	40c. to 41c.
Manganese ore, Brazilian, African or Indian, basis 50%	40c. to 42c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$11.00 to \$11.50
Chrome ore, Indian basic, 48% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard.....	\$22.50
Molybdenum ore, 85% concentrates of MoS ₃ , delivered	50c. to 55c.

Coke	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.90 to \$3.00
Foundry, f.o.b. Connellsville prompt	4.00 to 4.50
Foundry, by-product, Ch'go ovens Foundry, by-product, New Eng- land, del'd	9.75
Foundry, by-product, Newark or Jersey City, delivered.....	12.00
Foundry, Birmingham	9.59 to 10.77
Foundry, by-product, St. Louis....	5.50 to 6.00
	10.25

Coal	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.30 to \$1.90
Mine run coking coal, f.o.b. W. Pa. mines	1.30 to 2.00
Mine run gas coal, f.o.b. Pa. mines	2.00
Steam slack, f.o.b. W. Pa. mines....	1.25
Gas slack, f.o.b. W. Pa. mines....	1.40 to 1.50

Ferromanganese	Per Gross Ton
Domestic, 80%, furnace or seab'd.....	\$95.00
Foreign, 80%, Atlantic or Gulf port, duty paid	95.00

Spiegeleisen	Per Gross Ton
Domestic, 19 to 21%	\$36.00 to \$37.00
Domestic, 16 to 19%	36.00

Electric Ferrosilicon	Per Gross Ton Delivered
50%	\$85.00 to \$87.50
75%	145.00

Bessemer Ferrosilicon	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
10%	\$35.00
11%	37.00

Silvery Iron	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
10%	\$34.00
11%	36.00

Other Ferroalloys	Per Gross Ton
Ferrotungsten, per lb. contained metal, del'd	\$1.00 to \$1.05
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. deliv- ered, in carloads.....	\$11.50c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobalt, 15 to 18%, per net ton, f.o.b. furnace, in carloads.....	\$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per net ton.....	\$91.00
Ferrophosphorus, electric, 24%, f.o.b. An- niston, Ala., per net ton.....	\$122.50

Fluxes and Refractories

Fluorspar	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines.....	\$17.00 to \$18.00
No. 2 lump, Illinois and Kentucky mines.....	\$20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid.....	\$16.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines.....	\$32.50

Fire Clay	Per 1000 f.o.b. Works
First Quality	
Second Quality	
Pennsylvania	\$43.00 to \$46.00
Maryland	43.00 to 46.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00
Kentucky	43.00 to 46.00
Missouri	43.00 to 46.00
Ground fire clay, per ton	7.00

Silica Brick	Per 1000 f.o.b. Works
Pennsylvania	\$42.00
Chicago	52.00
Birmingham	60.00
Silica clay, per ton.....	\$8.50 to 10.00

Magnesite Brick	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	49.00

Chrome Brick	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts	Per 100 Pieces
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
Machine bolts .....	.70
Carriage bolts .....	.70
Lag bolts .....	.70
Plow bolts, Nos. 1, 2, 3 and 7 heads.....	.70
Hot-pressed nuts, blank or tapped, square....	.70
Hot-pressed nuts, blank or tapped, hexagon....	.70
C.p.c. and t. square or hex. nuts, blank or tapped .....	.70
Washers* .....	.675c. to .650c. per lb. off list

*F.o.b. Chicago and Pittsburgh. †Bolts with rolled threads up to and including ½ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	Per Cent Off List
Semi-finished hexagon nuts.....	.70
Semi-finished hexagon castelled nuts, S.A.E. ....	.70
Stove bolts in packages.....	.80, 10 and 5
Stove bolts in bulk.....	.80, 10, 5 and 2½
Tire bolts .....	.60 and 5

Large Rivets	Base per 100 Lb.
(½-In. and Larger)	
F.o.b. Pittsburgh or Cleveland.....	\$2.75
F.o.b. Chicago	2.85

Small Rivets	Per Cent Off List
(¾-In. and Smaller)	
F.o.b. Pittsburgh .....	.70, 10 and 5
F.o.b. Cleveland .....	.70, 10 and 5 to 70 and 10
F.o.b. Chicago .....	.70, 10 and 5 to 70 and 10

Cap and Set Screws	Per Cent Off List
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 250 lb. or more)	
Milled cap screws.....	.80, 10 and 10
Milled standard set screws, case hardened.....	.80 and 10
Milled headless set screws, cut thread.....	.80
Upset hex. head cap screws, U.S.S. thread.....	.80 and 5
Upset hex. cap screws, S.A.E. thread.....	.85 and 5
Upset set screws.....	.80, 10 and 10
Milled studs .....	.70 and 5

Chicago

New Business in Steel Recedes — Ferro-manganese Offered at \$90

CHICAGO, March 24.—New business in steel is slowly shrinking but production remains at the comparatively high rate of recent weeks. Producers are taking a less confident view of the future and buyers are indicating their attitude by ordering in unusually close step with actual requirements. The gap between specifications and shipments has widened.

On the whole, the manufacturing trade is holding to an even gait, but other users of steel, such as the building industry and railroad car builders, are not placing the usual amount of tonnage. Car shops in and around Chicago are operating at 60 per cent or less of capacity, with the prospect of further curtailment unless orders that are not now foreseen develop. At the same time, it is apparent that car builders still hope for a change for the better and are trying to keep their present organizations intact. The trade believed that the Illinois Central might buy against its car inquiry this week, but it now appears that purchases will not be made before June 1 at the earliest. Building programs in prospect are far out of line with actual awards, and competition for structural steel is severe, as shown by the anxiety of large shops to take tonnages that ordinarily go to small fabricators.

Pig Iron.—The market is quiet except for spot buying, which grows more active as the second quarter nears its end. Large inquiries are almost wholly lacking, although here and there a user is preparing to order third quarter iron. Current sales, as a rule, are being made quietly and without general requests for prices. An Eastern producer has taken 750 tons for delivery in western Michigan. The silvery market is moderately active, and one Chicago user has placed 500 tons of the 10 per cent grade. Reports that pig iron would be shipped to Chicago by boat seem to have had their origin in efforts by certain dealers to solicit orders in the hopes of bringing in pig iron by water.

Prices per gross ton at Chicago:

Northern No. 2 foundry, sil. 1.75 to 2.25	\$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil.	20.00
High phosphorus	20.00
Lake Superior charcoal, averaging sil. 1.50	27.04
Southern No. 2 fdy (all rail)...	24.01
Southern No. 2 (barge and rail)	22.18
Low phos., sil. 1 to 2 per cent, copper free	\$31.50 to 32.00
Silvery, sil. 8 per cent.	33.29
Bessemer ferrosilicon, 14 to 15 per cent	46.79

Prices are delivered at consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—Sellers of ferromanganese are offering that commodity for immediate delivery at \$90, seaboard, or \$97.56, delivered Chicago. This action has caused no rush of new business, the most far-reaching result having been a marking down of old contracts, all of which had been written with protective clauses. Although going business is small, orders for spiegel-eisen for prompt delivery are being taken at \$42.56, delivered, for the 19 to 21 per cent grade. Specifications for ferrosilicon are liberal.

Prices delivered Chicago: 80 per cent ferromanganese, \$97.56; 50 per cent ferrosilicon, \$85 to \$87.50; spiegel-eisen, 18 to 22 per cent, \$42.56.

Bolts, Nuts and Rivets.—Specifications show improvement. The trade does not regard this as an increase in use but as an indication that the heavy specifications issued prior to the price changes are rapidly running out. Contracts for the third quarter will probably be offered to buyers in the first week in June.

Plates.—The disposition of pending tank tonnage from oil producing districts is still in doubt, reports varying as to the extent to which efforts to curtail production have been successful. The belief is gaining ground that eventually the tonnage asked for will be placed, but that it will come into the market at a slower rate than was the case with tankage bought during the spring months. Producers of plates point to an

order for 1000 tons from the Montana oil fields as evidence of this trend. The railroad equipment market is dull, the only important inquiry being that of the Illinois Central for 4200 cars. Earlier in the year it was reported that this railroad would buy close to 9000 cars, but it now appears that the present inquiry will represent full requirements for the time being. Specifications for plates from railroad car builders are light, and mills are rapidly reaching the point where they will be urgently in need of new business or will of necessity curtail production. Competition for going business is unusually keen, and while prices are holding at 2c. in and near Chicago, shading is general in all outlying districts.

Mill prices on plates per lb.: 2c., Chicago.

Structural Material.—Fresh projects of noteworthy size continue to develop in architects' offices, but they are unusually slow in reaching the stage where figures are invited on the structural tonnage required. The State Line Generating Co., Hammond, Ind., will soon ask for bids on the first unit of a new super-power station and the Steuben Club, Chicago, has acquired property and is having plans prepared for a 35-story structure. Prices for fabricated steel are a trifle lower. Small shops are slackening their pace, which at the peak this spring reached only 60 per cent of capacity. Uneasiness over the situation is evidenced by large fabricators, who are reaching out for jobs of 300 tons and smaller and, by so doing, are adding to the difficulties of the small shops. Reports indicate that structural business is relatively good in St. Louis and at Milwaukee. Shops at Kansas City and Omaha are faring little or no better than those in Chicago.

Mill prices on plain material per lb.: 2c., Chicago.

Bars.—Specifications for soft steel bars are holding steady at the rate of last week, and mill schedules are full for about five weeks in advance. New buying has dropped off sharply, a condition not wholly unlooked for by producers, who are considering opening books for the third quarter at an early date. Automobile makers and accessory manufacturers are entering specifications for next month, and the indications are that shipments to those users in June will approximate those made during May. A noteworthy change is taking place, however, in that the automobile trade is taking steel in much closer step with its immediate requirements. The general demand for soft steel bars has run unusually large this year. Shipments have been consistently heavy and at approximately the rated capacity of local mills. Although there are a number of outstanding users, it is the general opinion among producers that the favorable situation of bar mills is due largely to a marked growth of demand from a large number of small and miscellaneous users. Quotations are fairly steady in Chicago at 2c. to 2.10c. Weakness, where evident, is more pronounced in the higher quotation, which is becoming increasingly difficult to maintain on mixed and small tonnages. Specifications for iron bars are of moderate size, but new buying does not afford mills an opportunity to build up backlogs. Prices, however, are steady at 2c., Chicago. New buying of rail steel bars is light and at extremely close range. Specifications still sustain double-turn operations at both Chicago Heights mills, but orders are troublesome to producers for the reason that they are unusually small and numerous and in practically all cases prompt shipment is demanded. The fence post business is good for this time of the year, but it is tapering sharply owing to the lateness of the season and to some extent to the unusually wet weather that is prevailing throughout most of the Middle West. The bulk of hard steel bar tonnage is going at 1.90c., Chicago, although on a fair amount of business 2c. is still being obtained.

Mill prices per lb.: Soft steel bars, 2c. to 2.10c., Chicago; common bar iron, 2c., Chicago; rail steel bars, 1.90c. to 2c., Chicago.

Reinforcing Bars.—Close to 2000 tons of reinforcing bars have been placed this week. An office building on Adams Street, Chicago, calls for 900 tons of rail and billet bars, and a garage will take 375 tons. Fresh projects continue heavier than contracts placed. Competition, with shops at 60 per cent of capacity, is keen, and while prices are holding well for small lots, there is evidence of weakness in quotations on 100 tons and over. Chicago warehouse prices for billet steel

reinforcing bars range from 2.30c. to 2.75c., and the asking prices for the rail steel bars are 2.10c. to 2.55c. Recent awards and new projects are shown on page 1573.

Wire Products.—Heavy rains throughout most of the Middle West have made country roads virtually impassable, and this is being reflected in the demand from jobbers. Producers of wire products believe, however, that the potential demand is there and that more favorable weather will again see country trade more active. Iowa, a good buyer up to several weeks ago, is suffering from poor transportation in rural districts. Trade in the Northwest is not picking up, while on the other hand orders from the South, particularly for nails to be used in rehabilitation of the flooded areas, are larger than at any time so far this year. Shipments of fencing are slowing down, but at a less rapid rate than last year at this time. Railroad specifications for this commodity are liberal. The manufacturing trade shows no change since last week, but the indications are that the total volume of business from that source in May will exceed by a small margin the tonnage taken in April. Prices appear to be taking a better stand, though shading of \$1 a ton on common wire nails and \$2 a ton on coated nails is still being practiced.

Rails and Track Supplies.—Specifications for standard-section rails are in good volume, and Chicago mill operations are holding at about 80 per cent of capacity. No additional new buying has developed this week, but a secondary rail-buying movement is looked for by producers, who point to the probability that the Chesapeake & Ohio will come into the market early in June for 20,000 to 25,000 tons. Fresh orders for track accessories total 5000 tons. The bulk of this business comes from two large railroads. Specifications for track supplies are liberal, allowing production to hold close to 80 per cent of capacity.

Prices f.o.b. mill, per gross ton: Standard-section open-hearth and Bessemer rails, \$43; light rails, rolled from billets, \$36 to \$38. Per lb.: Standard railroad spikes, 2.90c.; track bolts with square nuts, 3.90c.; steel tie plates, 2.35c.; angle bars, 2.75c.

Sheets.—Sales of sheets are taking a turn for the better, and mill production in this district has been stepped up to about 90 per cent of capacity. Producers have not opened third quarter books; in fact, they are reluctant to do so, though they admit that current orders are at extreme close range and afford operations only from week to week. Rolling schedules, though not far in advance, are more extended than of late, and orders are better balanced. Deliveries have changed but little, black and galvanized sheets being obtainable for prompt shipment and blue annealed in from three to four weeks. The demand for roofing is falling except from the South. The effects of the floods in the Mississippi River Valley on business are varied. For the most part, specifications from that territory are being held up, but manufacturers and jobbers catering to the building industry are beginning to release orders for shipment in the near future.

Prices per lb., delivered from mill in Chicago: No. 24 black, 3.15c.; No. 24 galvanized, 4c.; No. 10 blue annealed, 2.40c. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforcing bars, billet steel.....	2.30c. to 2.75c.
Cold-finished steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands.....	3.65c.
Hoops.....	4.15c.
Black sheets (No. 24).....	3.95c.
Galvanized sheets (No. 24).....	4.80c.
Blue annealed sheets (No. 10).....	3.50c.
Spikes, standard railroad.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	3.60c.
Rivets, boiler.....	3.60c.
	Per Cent Off List
Machine bolts.....	60
Carriage bolts.....	60
Coach or lag screws.....	60
Hot-pressed nuts, squares, tapped or blank..	60
Hot-pressed nuts, hexagons, tapped or blank..	60
No. 8 black annealed wire, per 100 lb.....	\$3.20
Common wire nails, base per keg.....	\$2.85 to 2.95
Cement coated nails, base per keg.....	2.95

Cast Iron Pipe.—Fresh inquiry from large municipalities is dragging, but private users, particularly gas companies, are still in need of a round tonnage. Wet weather is holding back pipe-laying programs, but producers do not believe that this condition will last long enough to affect shipments from foundries. The market is more or less nominal at \$35 to \$36, Birmingham, or \$43.20 to \$44.20, delivered Chicago, for 6-in. and larger diameter pipe. Deliveries are improving slowly, and now range from 30 to 45 days. The United States Cast Iron Pipe & Foundry Co. has taken 300 tons of 4, 6 and 8-in. pipe for Wooster, Ohio, and the Lynchburg Foundry Co. has been awarded 330 tons of 10, 16 and 18-in. pipe by Springfield, Ill. Other orders include 330 tons of 6, 8 and 12-in. pipe for Royal Oak, Mich., to the American Cast Iron Pipe Co., and 400 tons of 6 and 12-in. for Manitowoc, Wis., to the National Cast Iron Pipe Co. It is reported here that Detroit has rejected bids on which French pipe was low.

Prices per net ton, delivered Chicago: Water pipe, 6-in. and over, \$43.20 to \$44.20; 4-in., \$47.20 to \$48.20; Class A and gas pipe, \$4 extra.

Old Material.—The scrap market in Chicago is developing further weakness, and it is generally believed that the bottom has not been reached. A small tonnage of heavy melting steel was purchased by a user at \$12.75 per gross ton, delivered. A fair tonnage of rerolling rails was taken at \$15 per gross ton. Users of blast furnace grades are holding out of the market, and it is difficult for dealers to get counter offers for that material. Shipments of country scrap coming into Chicago are not so heavy as several weeks ago, but railroad scrap is coming in rapidly. The element of speculation is lacking. Dealers hesitate to place scrap on the ground and prefer to take orders even at the low level of prices prevailing today.

Prices delivered consumers' yards, Chicago:

Per Gross Ton	
Basic Open-Hearth Grades	
Heavy melting steel.....	\$12.25 to \$12.75
Shoveling steel.....	12.25 to 12.75
Frogs, switches and guards, cut apart, and miscellaneous rails.	12.50 to 14.00
Hydraulic compressed sheets....	10.50 to 11.00
Drop forge flashings.....	9.50 to 10.00
Acid Open-Hearth Grades	
Forged, cast and rolled steel car-wheels.....	14.50 to 15.00
Railroad tires, charging box size.	14.75 to 15.25
Railroad leaf springs, cut apart..	14.75 to 15.25
Steel couplers and knuckles.....	14.50 to 15.00
Coil springs.....	15.00 to 15.50
Low phosphorus punchings.....	14.50 to 15.00
Electric Furnace Grades	
Axle turnings.....	11.75 to 12.25
Blast Furnace Grades	
Axle turnings.....	10.25 to 10.75
Cast iron borings.....	10.00 to 10.50
Short shoveling turnings.....	10.00 to 10.50
Machine shop turnings.....	7.25 to 7.75
Rolling Mill Grades	
Iron rails.....	13.50 to 14.00
Rerolling rails.....	15.25 to 15.75
Cupola Grades	
Steel rails, less than 3 ft.....	15.50 to 16.00
Angle bars, steel.....	13.50 to 14.00
Cast iron carwheels.....	13.75 to 14.25
Malleable Grades	
Railroad.....	13.75 to 14.25
Agricultural.....	13.75 to 14.25
Miscellaneous	
*Relaying rails, 56 to 60 lb.....	25.50 to 26.50
*Relaying rails, 65 lb. and heavier	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades	
Iron angle and splice bars.....	12.50 to 14.00
Iron arch bars and transoms....	18.50 to 19.00
Iron car axles.....	20.50 to 21.00
Steel car axles.....	17.00 to 17.50
No. 1 railroad wrought.....	11.00 to 11.50
No. 2 railroad wrought.....	10.50 to 11.00
No. 1 busheling.....	9.25 to 9.75
No. 2 busheling.....	6.00 to 6.50
Locomotive tires, smooth.....	14.25 to 14.75
Pipes and flues.....	7.50 to 8.00
Cupola Grades	
No. 1 machinery cast.....	15.50 to 16.00
No. 1 railroad cast.....	14.50 to 15.00
No. 1 agricultural cast.....	14.25 to 14.75
Stove plate.....	12.50 to 13.00
Grate bars.....	12.00 to 12.50
Brake shoes.....	10.50 to 11.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

New York

Pig Iron Quiet, Scrap Weak—Continued Activity in Structural Steel

NEW YORK, May 24.—The pig iron market is "between seasons." In view of the prevalent policy of short-term buying, which affects finished and secondary products as well as primary materials, melters have relatively small forward bookings and are apprehensive lest they will carry a considerable part of the pig iron now on order into the third quarter. Under the circumstances little interest is being shown in pig iron requirements for that period. Current purchases, limited to iron for early delivery, call for relatively small tonnages. One of the largest inquiries, from the American Locomotive Co. for its Schenectady, N. Y., plant, calls for 600 tons of high manganese iron. Prices, which have undergone no real test, are substantially unchanged. Furnaces in eastern New York and New England appear to be more active in sales effort than other producers. No. 2 plain foundry iron for shipment by barge is now available at \$19.75, delivered alongside in the lighterage limits of New York and Brooklyn, with the possibility that this figure might be shaded 25c. a ton on an inquiry for 1000 tons or more. In New England nearby furnaces are getting most of the current business, but inasmuch as these producers are themselves widely separated and a common freight rate governs on shipments from Buffalo to most of the New England States, there is greater uniformity in delivered prices than in the base prices at furnace. Whereas the nearby producers are quoting all the way from \$18 to \$20, base furnace, delivered prices range from about \$20.50 to \$21.50. Sales by local brokers during the week totaled approximately 7000 tons.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25 (all rail).....	\$22.41
No. 2 plain fdy. (by barge, del'd alongside in lighterage limits N. Y. and Brooklyn).....	\$19.75 to 20.50
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	21.89 to 23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	22.39 to 23.52
East. Pa. No. 1X fdy., sil. 2.75 to 3.25.....	22.89 to 24.02
No. 2 Virginia fdy., sil. 1.75 to 2.25.....	27.04

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania, \$6.54 from Virginia.

Reinforcing Bars.—The McClintic-Marshall Co. will furnish 1600 tons of concrete bars for a sewer in Brooklyn, and the Concrete Steel Co. will provide 500 tons for a hospital in Rockland County, N. Y. About 600 tons of foreign bars has been bought for the approach to the Holland vehicular tunnel in Jersey City and will probably come largely from a German mill. Several small projects have been let during the week, but new inquiries continue to appear at a much better rate than bookings are announced. Nearly 3000 tons of bars will be required for large jobs alone on which inquiries have come out in the last 10 days, and a similar tonnage is needed in the large jobs pending in the metropolitan territory on which inquiries had been made previously. Prices are unchanged.

Prices per lb. on billet steel reinforcing bars: From mill, 1.90c., Pittsburgh. Out of New York warehouse, 3.15c., delivered at job. Out of Youngstown warehouse, 2.50c., Youngstown, or 2.87½c., delivered New York.

Finished Steel.—Steel business is in lighter volume, except possibly in structural steel, contracting for building construction continuing at a fair rate, although not quite at the pace of earlier months of the year. However, the leading Eastern structural mill reports that May rollings may exceed those of any month so far this year. The largest structural project in the market is the New York Athletic Club building, which will take about 6100 tons; two school buildings call for a total of 4500 tons. In the price situation there are reports of continued weakness in some products and attempts to strengthen prices in others. Following the example of sheet manufacturers, some of the plate mills are announcing their intention of adhering more firmly to a minimum of 1.85c., Pittsburgh, for

prompt shipments with 1.90c. as the contract price for third quarter. Some tonnage has recently been booked at 1.80c., with car builders and other special buyers getting lower figures. The strength of the sheet market at the new prices lies more in the firm quotations by mills than in sales. Some sales offices have made no sales whatever at the higher levels; consumers and jobbers in this district seemingly have well supplied their needs prior to the advance. Orders and specifications for pipe have fallen to a low point owing to a continuance of the plumbers' strike in Brooklyn and the lock-out in Manhattan.

Mill prices per lb. delivered New York: Soft steel bars, 2.19c. to 2.24c.; plates, 2.14c. to 2.24c.; structural shapes, 2.09c. to 2.24c.; bar iron, 2.14c. to 2.24c.

Warehouse Business.—The volume of orders for material from stock has been fairly large since early in the month, and present indications are that May will prove to be the best month thus far this year.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.34c.
Soft steel bars and small shapes.....	3.24c.
Iron bars.....	3.24c.
Iron bars, Swedish charcoal.....	7.00c. to 7.35c.
Cold-finished steel shafting and screw stock—	
Rounds and hexagons.....	4.00c.
Flats and squares.....	4.50c.
Cold-rolled strip, soft and quarter hard..	5.75c.
Hoops.....	4.49c.
Bands.....	3.99c.
Blue annealed sheets (No. 10 gage).....	3.89c.
Long terne sheets (No. 24 gage).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galvanized annealed.....	5.15c.
Tire steel, 1½ x ½ in. and larger.....	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger.....	3.65c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.
Machine bolts, cut thread: Per Cent Off List	
¾ x 6 in. and smaller.....	50 to 50 and 10
1 x 30 in. and smaller.....	45 to 50
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	50 and 10
¾ x 20 in. and smaller.....	50
Coach screws:	
¾ x 6 in. and smaller.....	50 and 10
1 x 16 in. and smaller.....	50
Boiler Tubes— Per 100 Ft.	
Lap welded steel, 2-in.....	\$17.33
Seamless steel, 2-in.....	20.24
Charcoal iron, 2-in.....	35.00
Charcoal iron, 4-in.....	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
¾-in. butt.....	46	29
¾-in. butt.....	51	37
¾-in. butt.....	53	39
2½-6-in. lap.....	48	35
7 and 8-in. lap.....	44	17
11 and 12-in. lap.....	37	12
Wrought Iron—		
¾-in. butt.....	4	+19
¾-in. butt.....	11	+9
1-1½-in. butt.....	14	+6
2-in. lap.....	5	+14
3-6-in. lap.....	11	+6
7-12-in. lap.....	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box.....	\$6.45	\$6.20
Charcoal, per box—	A	AAA
IC.....	\$9.70	\$12.10
IX.....	12.00	14.25
IXX.....	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating.....	\$10.00 to \$11.00
IC—30-lb. coating.....	12.00 to 13.00
IC—40-lb. coating.....	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20.....	4.00c.
No. 22.....	4.15c.
No. 24.....	4.20c.
No. 26.....	4.30c.
No. 28*	4.45c.
No. 30.....	4.70c.

Sheets, Galvanized

	Per Lb.
No. 14.....	4.35c. to 4.60c.
No. 16.....	4.45c. to 4.70c.
No. 18.....	4.60c.
No. 20.....	4.75c.
No. 22.....	4.80c.
No. 24.....	4.95c.
No. 26.....	5.20c.
No. 28*	5.45c.
No. 30.....	5.85c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Except for occasional slight concessions on black and galvanized sheets, prices are generally firm. Demand for structural material has improved, and jobbers report some sizable lots shipped this month.

Ferroalloys.—There are definite reports that ferro-manganese is being offered under \$95, seaboard basis, and down as low as \$90, but confirmation is unobtainable. There are inquiries before the market for 400 to 500 tons, some for early and some for last half delivery, but otherwise the market is very quiet. There have been the usual inquiries and sales of carloads and small lots. There is no activity reported in spiegeleisen and prices are unchanged. There is the usual small lot and carload business. Specifications on contract for ferrosilicon and ferrochromium are reported satisfactory.

Cast Iron Pipe.—Current purchasing is almost entirely confined to small lots. As an example of the size of some of these purchases, Newburgh, N. Y., has closed on about 30 tons of water pipe and Kearny, N. J., has purchased about 40 tons. The present market seems to range from as low as \$35 per ton, base, Birmingham, quoted occasionally by at least one Southern foundry to about \$38 to \$39 per ton. The tonnage for Rochester, N. Y., inquired for by the J. G. White Engineering Co., New York, has not yet been closed. Northern pipe makers are evidently well booked with tonnage in the smaller sizes, but are in a position to offer fairly prompt shipment on diameters larger than 10 in. to 12 in.

Prices per net ton, delivered New York: Water pipe, 6-in. and larger, \$45.60 to \$47.60; 4-in. and 5-in., \$50.60 to \$52.60; 3-in., \$60.60 to \$62.60; Class A and gas pipe, \$5 extra.

Old Material.—Buying prices of several grades show a further decline this week. No. 1 heavy melting steel is still being purchased at 14 per ton, delivered Bethlehem, Pa., but brokers filling recent contracts with a Claymont, Del., consumer are quoting \$13.50 per ton, delivered. Shipments are also going forward to Conshohocken and Coatesville, Pa., at \$13.50 to \$14 per ton. The buying price on heavy melting steel, yard, ranges from \$11.25 per ton, delivered to a Pottsville, Pa., consumer to \$11.50 per ton, delivered Harrisburg, Pa. While \$13 per ton, Lebanon, Pa., is still being offered by some brokers with contracts for specification pipe, others offer only \$12.50 per ton, delivered Lebanon. Chemical borings are being bought for consumers at Bound Brook, Gibbstown, N. J., and at Long Island City, New York. The current quotation on forge fire is nominal, as no recent transactions are reported in this district.

Dealers' buying prices per gross ton, New York:

No. 1 heavy melting steel.....	\$10.00 to \$11.35
Heavy melting steel (yard).....	7.50 to 7.75
No. 1 heavy breakable cast.....	11.25 to 11.75
Stove plate (steel works).....	7.50 to 8.50
Locomotive grate bars.....	9.00 to 9.50
Machine shop turnings.....	6.75 to 7.75
Cast borings (blast furnace or steel works).....	7.25 to 7.75
Mixed borings and turnings.....	7.00 to 7.75
Steel car axles.....	15.50 to 16.00
Iron car axles.....	23.00 to 23.50
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	8.75 to 9.25
Forge fire (nom.).....	8.00 to 8.50
No. 1 railroad wrought.....	12.50 to 13.00
No. 1 yard wrought, long.....	11.50 to 12.00
Rails for rolling.....	11.50 to 12.00
Cast iron car wheels.....	11.00 to 11.50
Stove plate (foundry).....	9.75 to 10.00
Malleable cast (railroad).....	11.00 to 11.50
Cast borings (chemical).....	12.50 to 13.50

Prices per gross ton, delivered local foundries:

No. 1 machinery cast.....	\$15.00 to \$15.50
No. 1 heavy cast (columns, building materials, etc.), cupola size	13.50 to 14.00
No. 2 cast (radiators, cast boilers, etc.).....	12.50 to 13.00

Coke.—There has been considerable activity during the past week in closing foundry coke contracts for the second half. Sizable renewals are reported made by the Keystone Coal & Coke Co. on beehive foundry coke and by the Seaboard By-Product Coke Co., the New England Coal & Coke Co. and the Providence Gas Co. on by-product foundry coke. For delivery over the second half, beehive foundry is quoted at \$5.35 per net ton, Connellsville, in open cars and at \$5.60 per ton for delivery in box cars. Furnace grade is quiet and demand is light, with many of the non-ferrous smelters and refiners in this district operating on a limited scale. The current market ranges from \$3.25 to \$3.75 per ton, Connellsville, for spot shipment, with

about \$3.75 per ton quoted for second half contracts. Foundry coke for prompt shipment is quoted at \$4.50 to \$5 per ton, Connellsville, but a few special brands have brought up to \$5.35 per ton. Delivered prices for Connellsville foundry coke are: To northern New Jersey, \$8.53 to \$9.03; New York or Brooklyn, \$9.29 to \$9.79; Newark or Jersey City, N. J., \$8.41 to \$8.91 per ton. By-product foundry coke continues at \$9.59 to \$10.77 per net ton, delivered Newark or Jersey City, N. J. By-product coke contracts are being renewed on a basis of price at time of delivery, while beehive contracts contain a wage clause.

Philadelphia

Steel and Pig Iron Markets Extremely Dull—Some Scrap Items Lower

PHILADELPHIA, May 24.—Considering the fact that there is still a fair amount of business coming to the mills, the steel situation is not quite so dull as surface indications make it appear to be. Orders are preponderately in small lots, and even a fair aggregate does not give the impression of real activity. The steel price situation shows no change within the week, quotations holding at about the figures of recent weeks. In pig iron there has been no buying of importance save three lots of low phosphorus iron totaling about 4800 tons. Scrap is dull, and some items in that list are slightly lower.

Pig Iron.—Three consumers of low phosphorus pig iron have made purchases within the week, the lots amounting to 3000, 1500 and 300 tons, a total of 4800 tons. Prices are said to have been held at very close to \$25, furnace, although foreign low phosphorus iron has been offered at as low as \$24.50, duty paid, Philadelphia. In foundry iron there has been a little buying for third quarter by some of the smaller users, but the aggregate has not been more than a few thousand tons. Quotations on foundry iron are being held firmly at \$21, furnace, for No. 2 plain and at \$21.50 for No. 2 X.

Prices per gross ton at Philadelphia:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$21.76 to \$22.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.26 to 22.76
East. Pa. No. 1X.....	22.76 to 23.26
Basic (delivered eastern Pa.).....	20.75 to 21.25
Gray forge.....	21.00 to 21.50
Malleable.....	22.50 to 23.00
Standard low phos. (f.o.b. New York State furnace).....	25.00
Copper bearing low phos. (f.o.b. furnace).....	25.00 to 26.00
Virginia No. 2 plain, 1.75 to 2.25 sil.	26.67
Virginia No. 2X, 2.25 to 2.75 sil.	27.17

Prices, except on low phosphorus, are delivered Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$5.17 from Virginia furnaces.

Billets.—One or two consumers in this district have tried to buy carbon billets on the basis of \$33, Pittsburgh, but Eastern mills are generally quoting a

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier.....	2.80c. to 3.00c.
Plates, ½-in.	3.00c. to 3.20c.
Structural shapes.....	2.65c. to 3.00c.
Soft steel bars, small shapes and iron bars (except bands).....	2.70c. to 3.20c.
Round-edge iron.....	3.50c.
Round-edge steel, iron finished, 1½ x 1½ in.	3.50c.
Round-edge steel, planished.....	4.30c.
Reinforcing steel bars, square, twisted and deformed.....	2.00c.
Cold-finished steel, rounds and hexagons.....	4.00c.
Cold-finished steel, squares and flats.....	4.50c.
Steel hoops.....	3.85c. to 4.15c.
Steel bands, No. 12 gage to ½-in., inclusive.....	3.60c. to 3.90c.
Spring steel.....	5.00c.
Black sheets (No. 24).....	4.35c.
Galvanized sheets (No. 24).....	5.20c.
Blue annealed sheets (No. 10)....	3.30c.
Diamond pattern floor plates—	
½-in.	5.30c.
¾-in.	5.50c.
Rails.....	3.20c.
Swedish iron bars.....	6.60c.

minimum of \$34, with the usual carbon extras. Forging quality billets remain at \$40, Pittsburgh.

Plates.—Some of the Eastern makers of plates are attempting to get quotations back to 1.90c., Pittsburgh, particularly as applying to third quarter contracts. Some of the recent sales have been at 1.80c. and 1.85c., the lower figure, however, being given only on tonnage of large size or to special buyers.

Structural Shapes.—The fact that two small steel fabricating shops in this district have recently gone into the hands of receivers is an indication of the fact that there is an insufficiency of structural steel work to keep existing plant capacity occupied. Even the larger and more efficient shops are in need of work. There is a dearth of new building projects. Plain material is being quoted, as in recent weeks, at 1.80c. and 1.85c., Pittsburgh, with concessions on large lots.

Bars.—A slight increase in the number of contracts for concrete buildings has given some of the bar mills a little better volume of bar business, but the total, including merchant steel, is far short of the ability of the mills to produce. Quotations on steel bars remain at 1.85c. and 1.90c., Pittsburgh. On bar iron Eastern mills quote 2.12c., delivered Philadelphia.

Sheets.—Only a very small amount of business in sheets has been done in this district since the announcement of the recent advance in prices. Such orders as have been taken, however, are at the higher levels, namely 2.25c. for blue annealed, 3c. for black and 3.85c. for galvanized.

Imports.—The following imports were received last week at Philadelphia: Chrome ore from Portuguese East Africa, 1600 tons; manganese ore from British India, 1500 tons; iron ore (as waste) from Germany, 528 tons; steel strips from England, 12 tons; bars from France, 55 tons; bars from Sweden, 25 tons; structural steel from Belgium, 90 tons.

Old Material.—Following the recent large sales of heavy melting steel to two Eastern steel companies, mentioned in this report a week ago, the scrap market has again lapsed into extreme dullness. Some items, notably bundled sheets, machine shop turnings, stove plate and grate bars and No. 1 cast are weaker.

Prices per gross ton, delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.....	\$14.00 to \$14.50
Scrap T rails.....	13.50 to 14.00
No. 2 heavy melting steel.....	12.00 to 13.00
No. 1 railroad wrought.....	16.50 to 17.00
Bundled sheets (for steel works)	10.50
Machine shop turnings (for steel works)	10.50
Heavy axle turnings (or equivalent)	12.50 to 13.00
Cast borings (for steel works and rolling mill)	11.50 to 12.00
Heavy breakable cast (for steel works)	15.50 to 16.00
Railroad grate bars.....	11.50 to 12.00
Stove plate (for steel works)	11.50 to 12.00
No. 1 low phos., heavy, 0.04 per cent and under.....	18.00 to 18.50
Couplers and knuckles.....	16.00 to 16.50
Roller steel wheels.....	16.00 to 16.50
No. 1 blast furnace scrap.....	10.50
Machine shop turnings (for rolling mill)	11.00 to 11.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Shafting.....	18.00 to 19.00
Steel axles.....	19.00 to 20.00
No. 1 forge fire.....	11.00 to 11.50
Steel rails for rolling.....	16.00 to 16.50
Cast iron carwheels.....	16.00 to 16.50
No. 1 cast.....	16.50 to 17.00
Cast borings (for chemical plant)	15.00 to 16.00

The Interstate Commerce Commission has ordered an investigation of all switching rates in the Chicago switching district, which cover steel, pig iron and scrap. The commission recently suspended a revised list of these rates drafted by the railroads and approved by the Chicago Association of Commerce, following a protest from shippers. This action by the commission is the sequel of a long controversy over switching rates started when the railroads proposed increases some time ago.

For building a new subway, which includes a tunnel under the East River at Fulton Street, New York, requiring about 55,000 tons of cast-iron segments to be purchased by the contractor, a low bid of \$22,246,000 was submitted by Mason & Hanger, Inc., New York, at the opening of bids May 18.

Cleveland

Steel Demand from Automobile Industry Tapering—Steel Prices Steady

CLEVELAND, May 24.—Orders for finished steel in this territory show little change from week to week. Buying is still in limited quantities, indicating that consumers are ordering material only as needed and are not supplementing these orders with steel for stock. The May volume is expected to be about the same as that in April. A slight tapering off is noticed in the demand for steel from the automotive industry. With the seasonal summer decline in the production of cars, of which there is already some evidence, the automobile manufacturers are delaying the placing of third quarter contracts. Neither are other consumers showing any interest in third quarter contracts, although some of the sheet and hot-rolled strip mills have opened their books for that delivery at the present prices. In the building field the demand for both structural material and reinforcing bars shows improvement.

Mills are meeting some pressure for price concessions, but there is considerable steadiness in prices in the immediate Cleveland territory. Quotations by outside mills on steel bars range from 1.85c. to 1.90c., Pittsburgh, but the lower price appears to be confined to rather attractive business. The local mill price is unchanged at 1.85c. to 1.90c., Cleveland. While ordinary tonnages of structural material are going at 1.90c., Pittsburgh, large-lot buyers are able to secure \$1 a ton concessions. The only activity in plates is in small lots, for which 1.90c., Pittsburgh, is the ruling price.

Pig Iron.—Aside from a limited amount of activity in spots, largely in Indiana, the market shows little life. Some consumers seem to think that they will be able to buy at lower prices for the third quarter, but regardless of whatever expectations they may have regarding price reductions, the general attitude of consumers is to defer third quarter buying until well along in June. An Indianapolis automobile foundry placed 2200 tons of foundry iron for the third quarter, which is understood to have gone to a Lake furnace. A Kokomo, Ind., foundry bought 1000 tons for the same delivery. A western Ohio foundry is inquiring for 600 tons, and a southwestern Ohio consumer, for 500 tons for the same delivery. There is virtually no activity in the northern Ohio territory. The General Motors Corporation, which recently inquired for 75,000 tons of foundry iron, has placed a contract with Toledo furnaces which is understood to be for its needs up to a maximum amount of 50,000 tons for delivery over 12 months, beginning July 1. This iron will take care of the company's requirements in excess of a large tonnage that it is taking from Detroit furnaces on a long-time contract. Owing to an increase that is being made in its foundry capacity the General Motors Corporation expects to melt considerably more iron than it has in the past. Shipping orders from the automotive industry have commenced to slow down a little, indicating that motor car builders are preparing for a seasonal summer slump in production, and business has fallen off with many of the gray iron jobbing foundries. However, some of the steel foundries report an improvement in business.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes.....	2.00c.
Soft steel bars.....	2.00c.
Reinforcing steel bars.....	2.75c. to 3.00c.
Cold-finished rounds and hexagons.....	3.15c.
Cold-finished flats and squares.....	4.15c.
Hoops and bands.....	3.95c.
Cold-rolled strip.....	3.65c.
Black sheets (No. 24).....	3.50c.
Galvanized sheets (No. 24).....	4.50c.
Blue annealed sheets (No. 10).....	3.25c.
No. 9 annealed wire, per 100 lb.....	\$2.90
No. 9 galvanized wire, per 100 lb.....	3.35
Common wire nails, base, per keg.....	2.90

*Net base, including boxing and cutting to length.

The only change in the price situation is a softening in the Michigan market, where in place of the price of \$19.50, furnace, recently ruling, there is a spread of from \$19 to \$19.50. This concession seems to have been brought about by the price situation at Cleveland, where a price of \$18, furnace, is commonly quoted for delivery to points in competitive territories. The range in Lake Erie furnace prices is generally \$18 to \$18.50. For the immediate Cleveland territory \$18.50, furnace, is quoted, but this price is untested.

Prices per gross ton at Cleveland:

N'th'n No. 2 fdy., sil. 1.75 to 2.25.	\$19.50
Southern fdy., sil. 1.75 to 2.25...	24.00
Malleable	19.50
Ohio silvery, 8 per cent.....	31.50
Basic, Valley furnace.....	18.00
Standard low phos., Valley fur..	27.50 to 28.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Strip Steel.—There is virtually no new demand for hot-rolled strip steel, and prices are untested. Specifications have slowed down, and some of the mills do not have much business on their books. Sales of cold-rolled strip are also very light, as consumers generally are covered for the remainder of the quarter.

Sheets.—Some small-lot sales are being made at the advanced prices of 3c., Pittsburgh, for black, 2.25c. for blue annealed and 3.85c. for galvanized, and these prices are being quite generally adhered to, although some of the Ohio mills are using a mill base on galvanized sheets and there are occasional concessions on black and blue annealed sheets, which are attributed to one or two small producers. Some of the mills have opened their books for the third quarter at the new prices, but consumers are showing no interest in placing contracts at this time. Most buyers are covered until July 1, and the real test of the market will not come until round-lot business is placed for the next quarter.

Warehouse Business.—Sales are only moderate. Sheets are not moving so well as last month. Sheet jobbers are holding to the old prices in spite of the mill advances.

Semi-Finished Steel.—Specifications are holding up to recent volume, and the leading local producer is still operating at close to capacity. There is little new business, as consumers are covered for the quarter. There is little talk as yet regarding third quarter prices.

Reinforcing Bars.—The market shows more life

than for some time. A Cleveland warehouse, requiring 480 tons, has been placed, and bids have been taken for another local warehouse, requiring 2000 tons, and for sewer work in Saginaw, Mich., requiring 1000 tons. Rail steel bars are unchanged at 1.70c. to 1.80c., mill.

Coke.—Several makers of high-grade foundry coke have opened their books for the renewal of contracts for the third quarter and last half at their present prices of \$5 to \$5.50, ovens, the contracts to include wage clauses. For prompt shipment standard grades range from \$4 to \$4.75, ovens. The curtailment in production has given the market a little firmer tone, but has not strengthened prices.

Bolts, Nuts and Rivets.—While bolt and nut orders are still light, they showed a slight improvement in the past week. Jobbers are well stocked, and there is very little demand from them. Prices are firm. The demand for rivets continues rather light.

Old Material.—A Cleveland steel plant during the week purchased 5000 to 6000 tons of blast furnace scrap, paying \$10.75, delivered. Dealers are covering for this material at around \$10.25. Most consumers are regulating shipments on contracts according to their requirements in order to avoid carrying much stock. Consequently shipments are rather moderate, and the supply is in excess of the demand. While the market lacks strength, there were no further declines in prices the past week.

Prices per gross ton, delivered consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.....	\$12.50 to \$13.75
No. 2 heavy melting steel.....	13.00 to 13.25
Compressed sheet steel.....	13.00 to 13.25
Light bundled sheet stampings...	12.00 to 12.50
Drop forge flashings.....	12.50 to 13.00
Machine shop turnings.....	9.00 to 9.25
No. 1 railroad wrought.....	11.50 to 12.00
No. 2 railroad wrought.....	13.75 to 14.00
No. 1 busheling.....	11.50 to 11.75
Pipes and flues.....	10.00 to 10.50
Steel axle turnings.....	12.50 to 13.00
Acid Open-Hearth Grades	
Low phosphorus forging crops...	16.50 to 17.00
Low phosphorus, billet bloom and slab crops	17.00 to 17.50
Low phosphorus sheet bar crops...	16.00 to 16.50
Low phosphorus plate scrap.....	16.00 to 16.50
Blast Furnace Grades	
Cast iron borings.....	10.25 to 10.50
Mixed borings and short turnings	10.25 to 10.50
No. 2 busheling.....	10.25 to 10.50
Cupola Grades	
No. 1 cast.....	16.50 to 17.00
Railroad grate bars.....	12.00 to 12.50
Stove plate	12.00 to 12.50
Rails under 3 ft.....	18.00 to 18.50
Miscellaneous	
Railroad malleable	15.50 to 16.00
Rails for rolling.....	16.25 to 16.50

TIN MILL WAGES LOWER

Decline of 3 Per Cent for May-June, Based on Lower Sales Prices

Tonnage rates paid sheet and tin mill workers in mid-Western mills operating under the sliding scale wage agreement of the Amalgamated Association of Iron, Steel and Tin Workers decline 3 per cent for May-June, to a rate 25½ per cent above base, as a result of the bi-monthly examination of sales sheets and settlement at Youngstown last week. It was disclosed that the average price of Nos. 26, 27 and 28 gage black sheets shipped during the 60 days ended April 30 had declined to 3c. per lb., from 3.10c., the average of two months before. This was a decline of two points in the card rate. For March-April, affected workers were paid a rate 28½ per cent above base.

The 3c. average compares with 3.25c. disclosed last fall, or a price \$5 per ton higher. For the period covered by the last examination, production and shipments registered a decline, as compared with the 60-day period immediately preceding. It is expected that prices will strengthen somewhat during the succeeding 60 days, though it is questioned whether tonnage rates will be advanced until fall.

Change in Base Gages Proposed

Sheet and tin mill operators expect to reach an agreement with representatives of employees, at the

annual wage conference which begins May 24 at Atlantic City. The Amalgamated Association proposes to change the present method of arriving at the tonnage rates, by including all gages from 20 to 31 inclusive, instead of 26, 27 and 28, as at present. However, the association suggests that joint committees be appointed representing the manufacturers and the employees, to discuss this proposal during the year and to report at the 1928 conference.

Boilers in puddling mills operating under the wage plan of the Amalgamated Association are seeking wage advances which will average 12 to 13 per cent of the present rates. Operators are receptive to a plan of granting a reasonable increase to puddlers and bar iron finishers.

Output of Metallic Cadmium in 1926 Increased

The production of metallic cadmium in the United States in 1926 amounted to 810,428 lb., valued at \$429,527, based on the average selling value of 53c. per lb., as reported by producers to the United States Bureau of Mines. These figures represent an increase of 61 per cent in quantity and 55 per cent in total value, as compared with 1925. The market quotation on American metal, New York, remained at 60c. per lb. throughout the year. No cadmium was imported into the United States in 1926.

San Francisco

Higher Ocean Freight Rates on Steel Expected—Jobbers Advance Sheets

SAN FRANCISCO, May 21 (By Air Mail)—In the opinion of local buyers, higher ocean freight rates on steel shipped from Atlantic Coast ports via the Panama Canal to the Pacific Coast are likely to be put into effect on or about July 1. Most of the so-called conference steamship companies are protecting shippers on the present rate—which is 25c., base, per 100 lb.—until June 30 only. While an advance of 10c., base, after that date is regarded as probable, it is considered doubtful whether all of the intercoastal lines will adhere to it. It is understood that some of the steamship companies have notified customers that any tonnage placed up to June 30 will be carried at the present rate even though the shipment is made at a later date.

Of interest during the week, which has been rather quiet, has been an advance of \$2 a ton in local jobbers' quotations on both black and galvanized sheets.

Pig Iron.—A local importer received a shipment of 200 tons of special analysis Scotch iron during the week. Current buying is light, and quotations are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	.....	\$25.00 to \$26.00
*Utah foundry, sil.	2.75 to 3.25	25.00 to 26.00
*Indian foundry, sil.	2.75 to 3.25	25.00
*German foundry, sil.	2.75 to 3.25	24.25

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Shapes.—Despite the fact that a good deal of work is being figured, lettings in fabricated structural steel have been light during the past fortnight. Awards of the week total about 700 tons, and fresh inquiries call for about 800 tons. The largest individual letting, 290 tons for a bridge over the Payette River in Idaho, was taken by the Portland Bridge Co., Portland, Ore. In Santa Barbara, Cal., a telephone building will require 500 tons, on which bids have been closed. Eastern mills continue to quote plain material at 2.35c., base, c.i.f. Coast ports.

Plates.—No fresh inquiries of importance have come up for bids during the week, and only one letting of over 100 tons has been reported, namely, 610 tons for a pipe line for the city of Sacramento, Cal., which was taken by the Western Pipe & Steel Co., San Francisco. Parker & Schram are low bidders on 1500 tons for a riveted steel pipe line for the Young's River water system at Astoria, Ore. On this project bids were taken also on wood-stave pipe, on which the Cascade Pipe Co. is the low bidder. No award has yet been made. In Beverly Hills, Cal., R. F. Ware is low bidder on 160 tons for a riveted pipe line. Eastern mills continue to quote plates at 2.30c., c.i.f. Coast ports.

Bars.—Total lettings in reinforcing bars for the week amount to about 600 tons; fresh inquiries call for 1165 tons. Locally, no individual jobs of 100 tons or over have been closed. In Oakland, Cal., the East Bay Municipal Utility District will open bids July 15 on 400 tons for the Lafayette dam, which is under construction. Local concrete bar jobbers quote as follows: 2.85c., base, per lb. on lots of 200 tons and 3.10c., base, on less-than-carload lots.

Cast Iron Pipe.—Lettings of the week include the following: San Diego, Cal., 1225 tons for street improvement work to unnamed companies through local general contractors; Seattle, Wash., 694 tons for street improvement work to an unnamed firm through local contractors; Santa Monica, Cal., 437 tons of 24-in. Class B pipe to the United States Cast Iron Pipe & Foundry Co.; Redmond, Wash., 293 tons of 6-in. Class

Warehouse Prices, f.o.b. San Francisco

Plates and structural shapes	.....	3.00c.
Soft steel bars	.....	3.00c.
Small angles, 1/2-in. and over	.....	3.00c.
Small angles, under 1/2-in.	.....	3.40c.
Small channels and tees, 1/2-in. to 2 1/2-in.	.....	3.60c.
Spring steel, 1/2-in. and thicker	.....	5.00c.
Black sheets (No. 24)	.....	4.70c.
Blue annealed sheets (No. 10)	.....	3.75c.
Galvanized sheets (No. 24)	.....	5.25c.
Common wire nails, base per keg	.....	\$3.75
Cement coated nails, 100-lb. keg	.....	3.75

B pipe to an unnamed maker; La Mesa, Cal., 155 tons of 12-in., Classes 50 and 150, centrifugal pipe to the United States Cast Iron Pipe & Foundry Co., and Corcoran, Cal., 47 tons of 4 and 6-in. Class B pipe to the Pacific States Cast Iron Pipe Co.

Steel Pipe.—It is expected that the city of Long Beach, Cal., will award 1515 tons of 1 1/4 to 24-in. gas pipe to the Crane Co. and the American Wholesale Hardware Co., the two lowest bidders.

Warehouse Business.—Local jobbers have advanced their quotations on both black and galvanized sheets 10c. per 100 lb. Quotations on blue annealed sheets remain unchanged. Buying is reported to be somewhat sporadic.

Rails and Railroad Equipment.—It is understood that the Great Northern Railway will build 800 box cars and trucks at its Hillyard shops, Spokane, Wash., during the next few months. Hillyard has been designated as one of the locomotive-building centers of the entire Great Northern system. Four locomotives, the largest ever built by the Great Northern, are now under construction there. A. Guthrie & Co., Portland, Ore., have been awarded a contract calling for an expenditure of \$4,000,000 by the Great Northern for the construction of 16 miles of new trackage from Winton to Leavenworth in Chelan County, Wash. It is announced that work will begin immediately.

Coke.—Quotations on foreign coke are slightly easier. English beehive fuel is offered now at \$17 per net ton at incoming dock—a reduction of 50c. since a week ago—and German by-product fuel is quoted at \$11.50 to \$12.50, a decline of from 50c. to \$1 since a week ago. Sales are somewhat heavier, especially in the Los Angeles district. Fresh shipments of coke from Europe are expected in June.

St. Louis

Some Buying of Steel for Flood Area But No Demand from Oil Fields

ST. LOUIS, May 24.—Buying of pig iron continues light, sales by the Granite City maker during the week totaling 2300 tons, of which 1500 tons went to a Rock Island melter and 500 tons to a St. Louis company and the remainder was in scattered carload lots. Not much business in pig iron is expected until there is a heavier backlog of orders in the hands of melters. While buyers are said to feel that prices are satisfactory and are not anticipating any lower levels for pig iron, they refuse to contract without orders in hand to absorb purchases of raw material.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	.....\$20.50 to \$21.00
Northern No. 2 fdy., delivered	.....
St. Louis	.....22.16
Southern No. 2 fdy., delivered	.....22.42
Northern malleable, delivered	.....22.16
Northern basic, delivered	.....22.16

Freight rates: 81c. from Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Coke.—An improvement in buying of domestic grades of coke is reported by by-product ovens, and shipments are heavier as the result of sales pressure, with the coal strike situation again an argument for buying. Buying of foundry grades is only fair.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and structural shapes	.....3.25c.
Bars, soft steel or iron	.....3.15c.
Cold-finished rounds, shafting and screw stock	.....3.75c.
Black sheets (No. 24)	.....4.80c.
Galvanized sheets (No. 24)	.....5.35c.
Blue annealed sheets (No. 10)	.....3.60c.
Black corrugated sheets	.....4.65c.
Galvanized corrugated sheets	.....5.30c.
Structural rivets	.....3.60c.
Boiler rivets	.....3.80c.
Per Cent Off List	
Tank rivets, 1/2-in. and smaller	.....70
Machine bolts	.....60
Carriage bolts	.....60
Lag screws	.....60
Hot-pressed nuts, square, blank or tapped	.....60
Hot-pressed nuts, hexagons, blank or tapped	.....60

Finished Iron and Steel.—The market generally is quiet, although there is some buying of material for replacement work in the flooded sections. Buying from the oil fields has fallen flat, and no revival is expected for some time because of the decision of various interests to curtail production. The construction industry is quiet here.

Old Material.—The market is virtually dead. Consumers are buying only an occasional car to fill in, and dealers are buying only against contracts. Very little is coming in from the country dealers, and what is coming can be sold only at a sacrifice. Heavy shoveling steel is off 75c. a ton, and No. 2 railroad wrought has declined 25c. Railroad lists include: Chicago, Milwaukee & St. Paul, 2300 tons; Chicago, Burlington & Quincy, 800 tons of rails; Chicago & Western Indiana, 350 tons; St. Louis-San Francisco, 500 tons, and Missouri Pacific, 150 tons.

Prices per gross ton f.o.b. dealers' yards and delivered St. Louis district consumers' works:

Heavy melting steel.....	\$11.50 to \$12.00
No. 1 locomotive tires.....	14.25 to 14.75
Heavy shoveling steel.....	11.50 to 12.00
Miscellaneous standard-section rails, including frogs, switches and guards, cut apart.....	12.75 to 13.25
Railroad springs.....	13.50 to 14.00
Bundled sheets.....	8.50 to 9.00
No. 2 railroad wrought.....	11.50 to 12.00
No. 1 bushing.....	10.00 to 10.50
Cast iron borings.....	9.00 to 9.50
Iron rails.....	14.00 to 14.50
Rails for rolling.....	14.00 to 14.50
Machine shop turnings.....	6.75 to 7.25
Steel car axles.....	19.00 to 19.50
Iron car axles.....	23.00 to 23.50
Wrought iron bars and transoms.....	19.50 to 20.00
No. 1 railroad wrought.....	12.00 to 12.50
Steel rails, less than 3 ft.....	15.50 to 16.00
Steel angle bars.....	12.00 to 12.50
Cast iron carwheels.....	14.00 to 14.50
No. 1 machinery cast.....	17.50 to 18.00
Railroad malleable.....	12.50 to 13.00
No. 1 railroad cast.....	15.00 to 15.50
Agricultural malleable.....	13.00 to 13.50
Relaying rails, 60 lb. and under.....	20.50 to 21.50
Relaying rails, 70 lb. and over.....	26.50 to 29.00

Birmingham

Fabricating Shops Busy—Price Reductions in Old Material

BIRMINGHAM, May 24.—Pig iron requirements for June of melters who obtain supplies in Alabama are being covered, and indications point to a sustained production of foundry iron, if not a slight increase. The new blast furnace of the Sloss-Sheffield Steel & Iron Co. in this city will be ready for operation next month, but meanwhile efforts are being concentrated on completing work under way at its North Birmingham coke plant so that the fuel requirements of the stack can be supplied. The surplus stocks of foundry iron in the hands of producers continue to be reduced, although furnace yards are by no means bare. Shipments of pig iron are very steady, facilitated by excellent railroad service. The dependability of transportation is resulting in an even more pronounced propensity to buy in small lots. A well maintained melt is reported among pressure pipe shops, as well as various other foundries, including stove plants, for example. Prices are unchanged at \$18 per gross ton, Birmingham, for No. 2 foundry. Ten furnaces in Alabama are on foundry, and 12 on basic. The larger melters do not appear to have any great tonnage of pig iron on their yards and will require a steady flow of shipments to supply their needs.

Prices per gross ton, f.o.b. Birmingham district furnaces:

No. 2 foundry, 1.75 to 2.25 sil...	\$18.00
No. 1 foundry, 2.25 to 2.75 sil...	18.50
Basic.....	18.00
Charcoal, warm blast.....	29.00

Rolled Steel.—Billet output and the operation of finishing mills are at the same pace as last week and, in fact, the past several weeks. Demand is considered fairly good, with considerable tonnage moving out of the district. Fabricating shops report a good volume of business and are maintaining steady operation to turn out the work. Larger fabricating shops, particularly, have recently received contracts which call for heavy production. Recovery of activity in fabricating shops has continued for the past three weeks, with

prospects bright for the immediate future. Mill quotations on the principal forms of finished steel are unchanged.

Cast Iron Pipe.—A large tonnage of pig iron is being melted by the pressure pipe shops, and shipments are heavy. Prices are weak, with continued reports of concessions below the quotations of \$36 to \$37, Birmingham, for 6-in. and larger diameters. The demand for soil pipe is slack, and prices are low.

Coke.—Prices are holding at \$5.50 per net ton, Birmingham, for foundry coke and at \$6 for the little beehive coke that is being manufactured. Considerable coke is moving, and indications point to the early placing of contracts on fall business. Railroads are now distributing orders for their 1927-1928 requirements of coal in this district. Coal production in Alabama is off temporarily, being down to 368,000 tons weekly.

Old Material.—Shipments are heavy, but the market may still be designated as quiet and prices are weak. A number of changes have been made in the appended list of prices, most of them reductions. Heavy melting steel is unchanged, although consumers are trying to buy at reductions of 25c. to 50c. a ton.

Prices per gross ton, delivered Birmingham district consumers' yards:

Heavy melting steel.....	\$12.00 to \$12.25
Scrap steel rails.....	12.50 to 13.00
Short shoveling turnings.....	8.50 to 9.00
Cast iron borings.....	8.50 to 9.00
Stove plate.....	13.00 to 14.00
Steel axles.....	16.00 to 17.00
Iron axles.....	16.00 to 17.00
No. 1 railroad wrought.....	11.00 to 12.00
Rails for rolling.....	13.00 to 14.00
No. 1 cast.....	15.00 to 16.00
Tramcar wheels.....	12.50 to 13.50
Cast iron carwheels.....	12.00 to 13.00
Cast iron borings, chemical.....	13.00 to 13.50

Boston

Pig Iron Sold for Fourth Quarter—Declines in Scrap Prices

BOSTON, May 24.—Competition among pig iron producers east of Buffalo is still so keen that Buffalo iron is not much of a factor in New England just now, and irons from eastern and western Pennsylvania, Virginia, and Alabama are taken only occasionally for mixture purposes. A New Hampshire melter has bought 300 tons of 2 to 2.50 per cent silicon foundry iron from a furnace east of Buffalo at less than \$22 a ton, delivered, or the equivalent of about \$16.50 a ton, base Buffalo. The same furnace sold a Providence, R. I., foundry several hundred tons of No. 2X iron at \$22 a ton, delivered. Delivery will be by truck; the charge, \$1.75 a ton, includes piling in the foundry yard. The equivalent Buffalo base on this business would be close to \$16 a ton. One furnace east of Buffalo has taken a limited amount of fourth quarter business in Providence at prices equally as low as those quoted above. Similar prices have been made on 200 tons of No. 2X and 100 tons of No. 1X for the current quarter and 400 tons of No. 2X and 200 tons of No. 1X for the third quarter required by a near-by

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates.....	3.365c.
Structural shapes—	
Angles and beams.....	3.365c.
Tees.....	3.265c.
Zees.....	3.465c.
Soft steel bars and small shapes.....	3.265c.
Flats, hot-rolled.....	4.15c.
Reinforcing bars.....	3.265c. to 3.54c.
Iron bars—	
Refined.....	3.265c.
Best refined.....	4.60c.
Norway, rounds.....	6.60c.
Norway, squares and flats.....	7.10c.
Spring steel—	
Open-hearth.....	5.00c. to 10.00c.
Crucible.....	12.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	4.015c. to 5.00c.
Hoop steel.....	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hexagons.....	4.05c.
Squares and flats.....	4.55c.
Toe calk steel.....	6.00c.

foundry, but the business remains open. No other inquiries of importance are reported.

Prices of foundry iron per gross ton, delivered to most New England points:

Buffalo, sil. 1.75 to 2.25.....	\$22.41 to \$22.91
Buffalo, sil. 2.25 to 2.75.....	22.91 to 23.41
East. Penn., sil. 1.75 to 2.25.....	24.15 to 24.65
East. Penn., sil. 2.25 to 2.75.....	24.65 to 25.15
Virginia, sil. 1.75 to 2.25.....	27.42
Virginia, sil. 2.25 to 2.75.....	27.92
Alabama, sil. 1.75 to 2.25.....	24.91 to 26.77
Alabama, sil. 2.25 to 2.75.....	25.41 to 27.27

Freight rates: \$4.91 from Buffalo, \$3.65 from eastern Pennsylvania, \$5.92 from Virginia, \$6.91 to \$8.77 from Alabama.

Coke.—New England makers of by-product foundry coke have opened their books for last half contracts, and it is estimated that approximately 90 per cent of the foundries in this district have signed. The current movement of foundry coke from ovens is rather limited, and there has been some accumulation of stocks at ovens. The New England Coal & Coke Co. and the Providence Gas Co. are making deliveries on a basis of \$12 a ton within a \$3.10 freight rate zone. Standard 72-hr. Connellsville foundry coke is offered at \$4.75 to \$5 a ton, on cars, or \$10.30 to \$10.55 a ton, delivered, with few takers.

Warehouse Business.—Warehouses have reduced wire nails on direct mill shipments 5c. a keg, making the less-than-carload price \$2.80 per keg, Pittsburgh, and the full carload price \$2.55. No change has been made on nails at local warehouses. Consumers of iron and steel continue to buy in small lots, and competition among warehouses for business is so keen that published scheduled prices are rather generally disregarded. Reinforcing bars are moving more freely, but in small individual lots, and more sales are made at 2.75c. per lb. than at 2.90c., the openly quoted price.

Imports.—Imports of pig iron during the first half of May consisted of a small consignment from Holland and 109 tons from India, the total being about 600 tons, contrasted with 110 tons in the first half of last month and 1994 tons in the first half of May, 1926. No iron ore was received in the first half of May, whereas 6050 tons was imported in the first half of April. Imports of cast iron pipe in the first half of May totaled 2287 pieces from Belgium, contrasted with 1446 from that country in the first half of April.

Old Material.—The market for heavy melting steel, steel turnings and scrap rails is all of 50c. a ton lower, and long bundled skeleton has dropped even more. Eastern Pennsylvania mills last week rejected offers of steel turnings at \$10.25 a ton, delivered, or the equivalent of about \$5.25 a ton, on cars, here. A Bridgeport, Conn., consumer has taken some at \$9.10 a ton, delivered. Part of the 5000 tons of No. 1 heavy melting steel recently bought by the Worth Steel Co., Claymont, Del., will be shipped from New England. The freight is \$4.41, making a price on cars here of about \$9.50. A fair tonnage of long bundled skeleton was moved in New England in the past week on old orders at \$5.50 a ton, on cars. A local foundry is taking a limited tonnage of heavy breakable cast at \$14.75 a ton, delivered Boston. In recent sales bundled cotton ties brought \$6.50, on cars shipping point, and shafting, \$14.50. The latter is scarce.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$9.00 to \$9.50
Scrap rails.....	9.00 to 9.50
No. 1 railroad wrought.....	11.50 to 12.00
No. 1 yard wrought.....	10.00 to 10.25
Machine shop turnings.....	5.00 to 5.50
Cast iron borings (steel works and rolling mill).....	6.50 to 7.00
Bundled skeleton, long.....	5.50 to 6.00
Forged flashings.....	5.50 to 6.00
Blast furnace borings and turnings.....	5.50 to 6.00
Forged scrap.....	6.20 to 7.00
Shafting.....	14.00 to 14.50
Street car axles.....	15.00 to 15.50
Wrought pipe (1 in. in diameter, over 2 ft. long).....	8.00 to 8.50
Rails for rerolling.....	11.00 to 11.50
Cast iron borings, chemical.....	10.50 to 11.00

Prices per gross ton, delivered consumers' yards:

Textile cast.....	\$14.50 to \$15.00
No. 1 machinery cast.....	14.50 to 15.00
No. 2 machinery cast.....	12.50 to 13.00
Stove plate.....	8.20 to 8.75
Railroad malleable.....	15.00 to 15.50

Cincinnati

Foundry Coke Specifications Drop—Structural Bookings Improve

CINCINNATI, May 24.—In pig iron the past week has been the dulllest of the year, transactions having been confined to small lots, ranging from single carloads up to 200 tons. Melters are specifying slowly against second quarter contract requirements, and a considerable tonnage is likely to be carried over into the third quarter. In the southern Ohio district sales have been so inconsequential that furnaces are finding it necessary to pile iron. Prices at Ironton are quoted at \$19 to \$19.50, base furnace, the former figure applying on shipments which can be made by barge. Lake Erie producers continue to book most of the sizable orders placed by consumers in southern and central Ohio and in Indiana. There has been no change in Jackson County silvery iron, which is selling at \$28.50, Jackson, for 8 per cent. Southern foundry iron is steady at \$18, base Birmingham, with only a limited amount moving to points north of the Ohio River. The only important inquiry is for 500 tons of foundry iron from a Springfield, Ohio, company.

Prices per gross ton, delivered Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25.....	\$20.89 to \$21.39
So. Ohio malleable.....	20.64 to 21.89
Alabama fdy., sil. 1.75 to 2.25.....	21.69
Alabama fdy., sil. 2.25 to 2.75.....	22.19
Tennessee fdy., sil. 1.75 to 2.25.....	21.69
Southern Ohio silvery, 8 per cent.....	30.39

Freight rates: \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Material.—Increased specifications and orders are reported by producers, the total tonnage being made up almost exclusively of small lots for prompt delivery. The growing amount of structural work in this territory is proving a surprise to many sellers, who find that fabricators are in a much better position than two or three weeks ago. In the sheet market, demand from consumers has been sustained on a fairly satisfactory basis. In fact, sales in the past 10 days have served to balance more closely the relationship between incoming business and production, the latter having run considerably ahead of the former during the first half of May. The roofing season has been only fair, because of bad weather. Shipments of sheets to the jobbing trade have been holding up well, while the demand for electrical sheets has been active. Automobile makers in the Detroit district are taking liberal tonnages, and indications are that no recession will occur in the next 30 days. The new price schedule is being maintained by all producers, with black and galvanized stock especially firm at 3c. and 3.85c., base Pittsburgh, respectively. Sheet mills in this territory are operating at almost 95 per cent of capacity, with no change contemplated in the immediate future. Bars and structural steel are fairly steady at 1.90c., base Pittsburgh, despite the pressure of buyers to obtain concessions of \$1 a ton. The wire goods market reflects weakness. Eastern sellers are offering common wire nails at \$2.50 per keg, base Pittsburgh, but a mill in the Ironton district is making better delivered prices on barge shipments to Ohio River consuming points.

Reinforcing Bars.—While there is a temporary lull

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
Reinforcing bars.....	3.30c.
Hoops.....	4.00c. to 4.25c.
Bands.....	3.95c.
Cold-finished rounds and hexagons.....	3.85c.
Squares.....	4.35c.
Open-hearth spring steel.....	4.75c. to 5.00c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue annealed sheets (No. 10).....	3.60c.
Structural rivets.....	3.55c.
Small rivets.....	.65 per cent off list
No. 9 annealed wire, per 100 lb.....	\$3.00
Common wire nails, base per keg.....	2.95
Cement coated nails, base per 100 lb. keg.....	2.95
Chain, per 100 lb.....	7.55
Net per 100 Ft.	
Lap welded steel boiler tubes, 2-in.....	\$18.00
4-in.....	38.00
Seamless steel boiler tubes, 2-in.....	19.00
4-in.....	39.00

in activities, many new jobs are expected to come out before the end of the month. New billet bars continue at 1.85c. to 1.90c., base Pittsburgh, and rail steel bars at 1.75c. to 1.80c., base mill.

Warehouse Business.—Despite the handicap of somewhat unfavorable weather, sales are forging ahead of those in April, and several important jobbers believe that the volume of business this month will be the best of the year. Structural steel, bars and sheets are leading in volume of orders. Prices remain firm and unchanged.

Coke.—By-product foundry coke specifications are running behind those in April, many consumers having requested a reduction of as much as 50 per cent in shipments. Foundries allied with the automotive industry, however, are taking liberal tonnages. Present prices of by-product foundry and domestic grades are expected to remain undisturbed. A consumer in northwestern Ohio probably will close this week for 500 tons of beehive coke, while a local company has bought 300 tons of foundry.

Foundry coke prices per net ton, delivered Cincinnati: By-product coke, \$9.52 to \$9.64; Wise County coke, \$7.59 to \$8.09; New River coke, \$10.09 to \$10.59. Freight rates: \$2.14 from Ashland, Ky.; \$2.59 from Wise County and New River ovens.

Old Material.—The market continues to sag, although prices are substantially the same as a week ago. Consumers are accepting a limited amount of material, but are purchasing little fresh tonnage. Dealers are of the opinion that there will be no improvement for from 30 to 60 days. Little scrap is coming out at the moment.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$12.00 to \$12.50
Scrap rails for melting.....	12.75 to 13.25
Loose sheet clippings.....	8.50 to 9.00
Champion bundled sheets.....	9.50 to 10.00
Cast iron borings.....	8.75 to 9.25
Machine shop turnings.....	7.75 to 8.25
No. 1 busheling.....	9.50 to 10.00
No. 2 busheling.....	7.00 to 7.50
Rails for rolling.....	14.00 to 14.50
No. 1 locomotive tires.....	15.50 to 16.00
No. 1 railroad wrought.....	12.00 to 12.50
Short rails.....	17.50 to 18.00
Cast iron carwheels.....	13.00 to 13.50
No. 1 machinery cast.....	17.50 to 18.50
No. 1 railroad cast.....	14.50 to 15.00
Burnt cast.....	8.50 to 9.00
Stove plate.....	10.00 to 10.50
Brake shoes.....	10.25 to 11.00
Railroad malleable.....	13.50 to 14.00
Agricultural malleable.....	13.00 to 13.50

Buffalo

Mill Operations at 80 Per Cent—Pig Iron and Scrap Quiet

BUFFALO, May 24.—The only sizable inquiry for pig iron in this district is one from the Kensington-Davis Corporation, Buffalo, for 3000 to 4000 tons of foundry. This is the largest tonnage that has appeared on the market in weeks. There is little other pending business, one maker reporting that other inquiries total only about 1000 tons. While a large inquiry may bring out concessions, the going price for small lots is now \$18, base Buffalo. Shipments are holding up well.

Prices per gross ton, f.o.b. Buffalo furnace:

No. 2 plain fdy., sil. 1.75 to 2.25.....	\$17.50 to \$18.00
No. 2X foundry, sil. 2.25 to 2.75.....	18.00 to 18.50
No. 1X foundry, sil. 2.75 to 3.25.....	19.00 to 19.50
Malleable, sil. up to 2.25.....	17.50 to 18.00
Basic.....	17.50 to 17.75
Lake Superior charcoal.....	27.28

Finished Iron and Steel.—Mills are operating about 80 per cent of capacity on the average. Bars are fairly firm at 2.165c., Buffalo, although 2.115c. has been

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars.....	2.75c.
Cold-finished flats, squares and hexagons.....	4.45c.
Rounds.....	3.95c.
Cold rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.30c.
Galvanized sheets (No. 24).....	5.15c.
Blue annealed sheets (No. 10).....	3.80c.
Common wire nails, base per keg.....	\$3.65
Black wire, base per 100 lb.....	3.90

done recently on sizable business. Business in sheets is fair with No. 24 black quoted at 3c., Pittsburgh, and automobile body sheets at 4.25c. Several reinforcing bar tonnages are up for figures. Buffalo Public School, No. 29, calling for 250 tons, and Buffalo Public School, No. 6, requiring 200 tons, are the principal pending projects. The wire business is good, with mill operations averaging 75 per cent.

Old Material.—The week has been almost featureless from the standpoint of new business. Dealers have been bending their efforts to satisfy the requirements of the mills, as represented by unfilled orders. Prices are firm at the figures quoted below, and there are no present indications of any deviation by the mills from their policy of hand-to-mouth buying. A recovery in the demand for low phosphorus scrap is expected from steel castings plants which have just booked sizable railroad orders.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.....	\$15.50 to \$16.00
No. 2 heavy melting steel.....	14.50 to 15.00
Scrap rails.....	16.00 to 16.50
Hydraulic compressed sheets.....	14.50 to 15.00
Hand-bundled sheets.....	11.00 to 11.50
Drop forge flashings.....	13.00 to 13.50
No. 1 busheling.....	14.50 to 15.00
Heavy steel axle turnings.....	14.00 to 14.50
Machine shop turnings.....	9.00 to 9.50

Acid Open-Hearth Grades	
Railroad knuckles and couplers.....	17.50 to 18.00
Railroad coil and leaf springs.....	17.50 to 18.00
Rolled steel wheels.....	17.50 to 18.00
Low phosphorus billet and bloom ends.....	17.50 to 18.00

Electric Furnace Grades	
Heavy steel axle turnings.....	14.00 to 14.50
Short shoveling steel turnings.....	11.50 to 12.00

Blast Furnace Grades	
Short shoveling steel turnings.....	11.50 to 12.00
Short mixed borings and turnings.....	10.00 to 10.50
Cast iron borings.....	11.00 to 11.50
No. 2 busheling.....	13.50 to 14.00

Rolling Mill Grades	
Steel car axles.....	17.00 to 17.50
No. 1 railroad wrought.....	13.00 to 13.50

Cupola Grades	
No. 1 machinery cast.....	16.50 to 17.00
Stove plate.....	14.00 to 14.50
Locomotive grate bars.....	13.00 to 13.50
Steel rails, 3 ft. and under.....	18.00 to 18.50
Cast iron carwheels.....	15.00 to 16.00

Malleable Grades	
Railroad.....	16.50 to 17.00
Agricultural.....	16.50 to 17.00
Industrial.....	16.50 to 17.00

Toronto

Steady Spot Demand for Pig Iron—Speculative Buying of Scrap

TORONTO, ONT., May 24.—Canadian pig iron sales for the week compare favorably with those of previous weeks, and indications are that a steady spot demand will continue for some time to come. Orders from foundries and other consumers are chiefly for immediate needs, averaging from 50 to 200 tons, with occasional orders running as high as 500 tons. Inquiry on third quarter account is more pronounced, but so far few contracts for that period have been placed. Producers are not anxious to close long term contracts for foundry and malleable iron, and while some are taking such business, others are refusing orders past the end of June. While the demand for pig iron is strong the price situation has not varied. Production figures for the month of April again indicate improvement, both in blast furnace operations and in sales of foundry and malleable iron.

Prices per gross ton:

Delivered Toronto	
No. 1 foundry, sil. 2.25 to 2.75.....	\$24.10
No. 2 foundry, sil. 1.75 to 2.25.....	24.10
Malleable.....	24.10

Delivered Montreal	
No. 1 foundry, sil. 2.25 to 2.75.....	26.50
No. 2 foundry, sil. 1.75 to 2.25.....	26.50
Malleable.....	26.50
Basic.....	25.50

Imported Iron at Montreal Warehouse	
Summerlee.....	\$4.00
Carron.....	36.00

Old Material.—While nothing of a spectacular na-

ture has developed in this market, business as a whole has shown improvement during the past week or two. Consumers are showing more interest in the market. Inquiries are on the increase and buying is more general, with individual orders calling for larger tonnages. The improvement in business is not confined to any single district, but is noted in both the Toronto and Montreal markets. In the Montreal market, in addition to the improved demand on local account, inquiries and sales for export have increased during the past couple of weeks. While prices have not advanced, speculative buying by dealers in both Toronto and Montreal is more pronounced.

Dealers' buying prices:

	Toronto	Montreal
<i>Per Gross Ton</i>		
Heavy melting steel.....	\$10.50	\$9.00
Rails, scrap.....	11.00	10.00
No. 1 wrought.....	11.00	14.00
Machine shop turnings.....	8.00	7.50
Boiler plate.....	8.00	8.00
Heavy axle turnings.....	8.50	8.50
Cast borings.....	8.50	7.50
Steel turnings.....	8.00	8.00
Wrought pipe.....	6.00	6.00
Steel axles.....	15.00	17.00
Axles, wrought iron.....	17.00	19.00
<i>Per Net Ton</i>		
No. 1 machinery cast.....	16.00	18.00
Stove plate.....	10.00	13.00
Standard carwheels.....	14.00	16.00
Malleable scrap.....	14.00	14.00

Canadian Pig Iron and Steel Output Increased in April

TORONTO, May 24.—The production of pig iron in Canada for April reached a total of 77,240 gross tons, an advance of 2 per cent over the 75,637 tons reported for March and 14 per cent over the output of 67,607 reported for April, 1926. The increase was accounted for by the greater tonnage of foundry pig iron produced, mostly for sale. For the four months ended with April the cumulative production of pig iron in Canada was 255,289 tons, an increase of 12 per cent over the 227,248 tons produced during the corresponding period of last year.

Steel ingots and castings produced in Canada during April amounted to 109,107 tons, or an increase of about 2 per cent over the March figures of 107,381 tons. In April of last year the output was 79,936 gross tons. The gain was altogether in the output of steel ingots for the further use of producing firms. For the four months ended with April the cumulative production of steel ingots and castings was 330,659 tons, a gain of 27 per cent when compared with the 260,394 tons reported for the corresponding four months of last year.

The Dominion Bureau of Statistics index number for iron and steel and its products (1913 prices equal 100) declined slightly during April to 143.7 from 144.6 in March. Pig iron prices were unchanged during the month.

Detroit Scrap Prices Believed at Bottom

DETROIT, May 24.—The market on waste material in this district has shown no firming factors during the past week, but there is an undercurrent of feeling that it is about on the bottom. Orders on dealers' books are sufficient to take care of material being released. Prices are unchanged.

	<i>Per Gross Ton</i>
Heavy melting and shoveling steel.....	\$12.50 to \$13.00
Borings and short turnings.....	8.25 to 8.75
Long turnings.....	7.50 to 8.00
No. 1 machinery cast.....	17.00 to 18.00
Automobile cast.....	19.00 to 20.00
Hydraulic compressed.....	11.00 to 11.50
Stove plate.....	13.50 to 14.50
No. 1 busheling.....	10.50 to 11.00
Sheet clipping.....	8.00 to 8.50
Flashings.....	10.50 to 11.00

Open competitive examinations for deputy commissioner, and examiner and investigator, respectively, of the United States Employees' Compensation Commission have been announced by the Civil Service Commission. Applications must be on file with the commission at Washington, not later than June 14.

STOPS USE OF FOREIGN BEAMS

Brooklyn Superintendent of Buildings Acts and Similar Action Pending in Bronx

Importers of steel and local fabricators and erectors in Brooklyn are temporarily facing a special situation in that borough of New York. Following the suspension of several contracts in Brooklyn because of the use of foreign-made steel in the buildings, the superintendent of buildings, A. E. Kleinert, prior to his departure on a trip to Europe, May 19, ordered that no foreign-made beams were to be used in buildings during his absence. Upon his return, it is understood that a further investigation may be made. About two weeks ago, one contract was held up by the building department until American beams were substituted for imported material and later, it is said, an order was issued that beams ranging from 8 in. to 12 in. were not to be used unless subjected to severe inspection. Since then, it is reported that similar action is under consideration in the borough of Bronx.

A committee appointed by a meeting of various importers in New York reports that it has been unable to learn the reason for the present prohibition on foreign beams, except for the statement of an official in Brooklyn that the building code does not mention foreign material as permissible of use. It is pointed out in some quarters that in a few instances importers, unable to secure beams rolled to American specifications, have delivered British standard beams, which on a number of sizes are slightly smaller or larger than the United States standard, this being offset by the heavier web.

In such cases as these, a British beam of 6 x 3 in. would be furnished for an American beam of 6 x 3.33 in., a 7 x 3.5 in. British beam for a 7 x 3.66 in. American standard, or a 9 x 4 in. British for a 9 x 4.33 in. American beam.

Whether or not this was the cause of the present order is not known and there is considerable confusion among importers and erectors as to the basis of the prohibition, as angles and tees and other foreign-made structural steel as well as reinforcing bars are apparently not included in the decision by the superintendent of buildings.

It is pointed out that many fabricators have accepted contracts for buildings in Brooklyn based on the use of foreign steel, and should the present decision of the city necessitate substituting the domestic product, serious loss might develop on some contracts. Meanwhile, consumers in Brooklyn are, in many cases, refusing to accept further shipment of foreign steel on old orders and importers are faced with the necessity of disposing of these tonnages elsewhere.

St. Louis Coke & Iron Corporation Acquired by Utilities Group

The St. Louis Coke & Iron Corporation, Chicago, with plant at Granite City, Ill., has been acquired by the Utilities Power & Light Corporation, Chicago, according to an announcement of H. L. Clark, president of the latter corporation. The Chicago concern has also gained control of the stock of the Laclede Gas & Electric Co. and its subsidiary the Laclede Gas Light Co., both of St. Louis. The total property value of the companies acquired is approximately \$60,000,000, of which \$10,000,000 is represented by the coke and iron company.

The St. Louis Coke & Iron Corporation, which was organized in its present form in 1925, following a friendly receivership, operates two 500-ton blast furnaces and 80 coke ovens on a 220-acre tract near Granite City. The plant has an annual capacity of 180,000 tons of pig iron and 500,000 tons of coke. The company also owns the Black Brier coal mine in southern Illinois. W. G. Maguire, president of the company, in commenting upon the purchase, stated that there would be no change in the personnel of the officers and that the same business policies would be continued. He went on to say that future expansion plans included the ultimate manufacture of steel products and the installation of 40 additional coke ovens.

FABRICATED STRUCTURAL STEEL

Contracts of the Week Call for 26,000 Tons and New Projects for 16,000 Tons

Structural steel awards in the week were about 26,000 tons, with no jobs of unusual size, and new projects call for about 16,000 tons, including 6100 tons for an athletic club in New York and 4500 tons for two New York high school buildings. Awards follow:

BOSTON, 1500 tons, Y. W. C. A. Building, to New England Structural Co.
BOSTON, 225 tons, Conservatory of Music, to New England Structural Co.
BOSTON, 100 tons, auditorium, Wentworth Institute, to New England Structural Co.
WORCESTER, MASS., 225 tons, car barn, Worcester Consolidated Street Railway, to Eastern Bridge & Structural Co.
WORCESTER, 160 tons, bus barn, Worcester Consolidated Street Railway, to Eastern Bridge & Structural Co.
SANDERSFIELD, MASS., 175 tons, bridge and approaches, to Boston Bridge Works, Inc.
LACONIA, N. H., 150 tons, State highway bridge, to Berlin Construction Co.
NEW YORK, 5200 tons in the following awards as reported to the Structural Steel Board of Trade, Inc.: Service station, 140th Street and Rider Avenue, and furniture warehouse, 1168 Second Avenue, to Hedden Iron Construction Co.; alteration, National Broadcasting Co. Building, 1 East Fifty-fifth Street, and Jewish Hospital, Prospect Place and St. Marks Avenue, Brooklyn, to Shoemaker Bridge Co.
NEW YORK, 550 tons, loft building, 236-240 West Twenty-seventh Street, to Hinkle Steel Construction Co.
NEW YORK, 480 tons, public school No. 30, Westerleigh, L. I., to Bethlehem Fabricators, Inc.
NEW YORK, 335 tons, apartment building, 39-49 Payson Avenue, to Randall Iron Works.
NEW YORK, 1850 tons, De Pinna store building on Fifth Avenue, to Hedden Iron Construction Co.
NEW YORK, 1500 tons, loft building on West Thirtieth Street, to Harris Structural Steel Co.
NEW ROCHELLE, N. Y., 350 tons, apartment building, to Easton Structural Steel Co.
PHILADELPHIA, 100 tons, Cobb's Creek bridge, to Bethlehem Steel Co.
PHILADELPHIA, 530 tons, George Allen store, to Shoemaker Bridge Co.
PETERSBURG, PA., 100 tons, highway bridge, to Bethlehem Steel Co.
GREENSBORO, N. C., 1400 tons, highway bridges, to Virginia Bridge & Iron Co.
DETROIT, 1400 tons, spring mill building for Ford Motor Co., to Whitehead & Kales Co.
DETROIT, 300 tons, Columbia office building for Michigan Bell Telephone Co., to American Bridge Co.
GRAND RAPIDS, MICH., 125 tons, office building for Michigan Bell Telephone Co., to Whitehead & Kales Co.
LANSING, MICH., 300 tons, highway bridge, to American Bridge Co.
CLEVELAND, 200 tons, building for Smith Incubator Co., to McClintic-Marshall Co.
CLEVELAND, 250 tons, warehouse for Ohio Bell Telephone Co., to National Iron & Wire Co.
ROCHESTER, N. Y., 650 tons, Harper Sibley garage, to American Bridge Co.
ERIE RAILROAD, 750 tons, transfer bridges, to Steele & Condit.
PENNSYLVANIA RAILROAD, 350 tons, terminal work, to American Bridge Co.
NEW YORK, NEW HAVEN & HARTFORD RAILROAD, 150 tons, bridge, to Bethlehem Steel Co.
PITTSBURGH, 850 tons, extension to plant of R. D. Nuttall Co., to American Bridge Co.
ADDYSTON, OHIO, 450 tons, addition to plant of United States Cast Iron Pipe & Foundry Co., to American Bridge Co.
CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILROAD, 450 tons, bridges, to Mount Vernon Bridge Co.
ASHLAND, KY., 200 tons, Ventura Hotel, to Vincennes Bridge Co.
GRAND RAPIDS, MICH., 200 tons, plant for Palpot Baking Co., to Lakeside Bridge & Steel Co.
GARY, IND., 375 tons, hospital, to American Bridge Co.
TERRE HAUTE, IND., 200 tons, educational building, to Indiana Bridge Co., Muncie.
DECATUR, ILL., 300 tons, Seventh Street viaduct, to Mississippi Valley Structural Steel Co.
HOPESTON, ILL., 103 tons, two schools, to Gage Structural Steel Co., Chicago.
CHICAGO, 100 tons, alterations to the Ogden Building, to Duffin Iron Co., Chicago.
NEWTON, IOWA, 200 tons, Y. M. C. A. building, to American Bridge Co.
OSHKOSH, WIS., 325 tons, Fischer-Paramount theater and hotel, to Lakeside Bridge & Steel Co.

MILWAUKEE, 125 tons, new plant for Racine Radiator Co., to Lakeside Bridge & Steel Co.
STATE OF MONTANA, 1000 tons, oil tanks, to Graver Corporation, East Chicago, Ind.
PUEBLO, COLO., 600 tons, crane runway for Colorado Fuel & Iron Co., to American Bridge Co.
BOISE, IDAHO, 290 tons, bridge over the Payette River, to Portland Bridge Co., Portland, Ore.
SACRAMENTO, CAL., 610 tons, pipe line for the city, to Western Pipe & Steel Co.
SAN FRANCISCO, 120 tons, apartment building, Geary Street and Thirty-second Avenue, to Golden Gate Iron Works.
SAN FRANCISCO, 200 tons, apartment building, California and Gough Streets, to Golden Gate Iron Works.

Structural Projects Pending

KINGSTON, R. I., 200 tons, building for Rhode Island State College.
NEW YORK, 6100 tons, building for New York Athletic Club.
NEW YORK, 2500 tons, high school building for Richmond Hill, L. I.
NEW YORK, 2000 tons, high school building for Far Rockaway, L. I.
NEW YORK, 150 tons, repair work for Interborough Rapid Transit Co.
HOOSICK FALLS, N. Y., 170 tons, bridge.
NEW YORK CENTRAL RAILROAD, 150 tons, bridge.
READING RAILROAD, 200 tons, bridge.
NORFOLK & WESTERN RAILROAD, 100 tons, bridge.
ATLANTIC CITY, N. J., 200 tons, office building.
ELIZABETH, N. J., 250 tons, hotel.
PHILADELPHIA, 1500 tons, office building on Walnut Street.
STATE OF PENNSYLVANIA, 150 tons, highway bridge in Lycoming County.
AKRON, OHIO, 500 tons, East Exchange Street highway bridge.
DETROIT, 200 tons, bridges for Detroit Terminal Railway Co.
CINCINNATI, 500 tons, Harrison Avenue viaduct.
VINCENNES, IND., 300 tons, hotel.
CHICAGO, 600 tons, factory building for Grinnell Co.
CHICAGO, tonnage being estimated, Ear, Eye, Nose and Throat Hospital.
EAST MOLINE, ILL., tonnage being estimated, warehouse for International Harvester Co.
HAMMOND, IND., tonnage not stated, generating station for State Line Generating Co.
PORTLAND, ORE., 100 tons, bridges for United States Bureau of Public Roads for construction in Idaho.
SANTA BARBARA, CAL., 500 tons, telephone building; bids in.
SAN JOSE, CAL., 155 tons, building for the *Mercury-Herald*; bids in.
REDWOOD CITY, CAL., 100 tons, Cottrell flue for Pacific Portland Cement Co.; bids in.
SELBY, CAL., 100 tons, building for the American Smelting & Refining Co.; bids in.

RAILROAD EQUIPMENT

Delaware, Lackawanna & Western Buys 500 Box Cars and Other Equipment

Railroad equipment business of the week consisted chiefly of 500 box cars ordered by the Delaware, Lackawanna & Western. Orders for about 4500 freight cars for the Illinois Central are expected shortly. Details of the week's business follow:

The Midland Valley Railroad is in the market for three locomotives.

The Chicago, Springfield & St. Louis will buy two freight locomotives.

The New York Central has purchased 10 special flat cars from the Standard Steel Car Co.

The Delaware, Lackawanna & Western has placed 200 box cars with the Magor Car Corporation, 300 box and 10 express cars with the American Car & Foundry Co., 20 milk cars with the Standard Steel Car Co. and two baggage and mail cars with the Pullman Car & Mfg. Corporation. This railroad has also ordered 10 3-cylinder freight and five 2-cylinder passenger locomotives from the American Locomotive Co.

The Chicago & Illinois Midland has ordered four caboose cars from the American Car & Foundry Co.

The Rodger Ballast Car Co. has ordered a plow car from the American Car & Foundry Co.

The Lehigh & New England has contracted with the American Car & Foundry Co. for the repair of 200 hopper cars.

The New York, New Haven & Hartford has ordered 20 baggage cars from the Standard Steel Car Co.

The New York Central has increased its recent order for 1000 box cars given to the American Car & Foundry Co. to 1050 cars.

The Great Northern is building 300 box cars and trucks at its Hillyard shops, Spokane, Wash. It also has four locomotives under construction there.

NON-FERROUS METAL MARKETS

The Week's Prices	May 24	May 23	May 21	May 20	May 19	May 18
Lake copper, New York....	12.87 1/2	12.87 1/2	13.00	13.00	13.00	13.12 1/2
Electrolytic copper, N. Y.*...	12.43	12.50	12.62 1/2	12.62 1/2	12.62 1/2	12.75
Straits tin, spot, New York.	67.75	67.87 1/2	...	67.62 1/2	67.25	67.50
Lead, New York.....	6.50	6.50	6.50	6.50	6.50	6.60
Lead, St. Louis.....	6.15	6.15	6.15	6.15	6.15	6.25
Zinc, New York.....	6.42 1/2	6.42 1/2	6.40	6.40	6.40	6.37 1/2
Zinc, St. Louis.....	6.07 1/2	6.07 1/2	6.05	6.05	6.05	6.02 1/2

Cents per Pound
for
Early Delivery

*Refinery quotation; delivered price 1/4c. higher.

NEW YORK, May 24.—Pronounced weakness has developed in copper and prices are considerably lower. Buying of tin has been quite heavy and quotations are higher than a week ago. Lead prices have been again reduced, but demand is not large. The zinc market has a better tone and prices are a little higher.

Copper.—Signs of weakness in the electrolytic copper market were detected a week ago and since then this tendency has developed into rather marked recessions in prices. Around 13c. and a little under, fair sales were made a week ago, but since then, with marked declines in prices, buying has been very light. Reports as to just what the metal can be purchased for vary because some producers are adhering to one price and others to another. It is evident, however, that the metal can be obtained today at a range of 12.62 1/2c. to 12.75c., delivered in the Connecticut Valley, with these prices largely nominal. Consumers, as well as their own customers, are watching the market carefully and are buying only what is necessary until they feel that the bottom has been reached. On Saturday, May 21, Copper Exporters, Inc., put into effect a new quotation, 13.20c., c.i.f. Hamburg, which is 15 points under the previous one. Yesterday there was fairly good buying from British and German consumers and today the export market has been fairly active. Lake copper is quoted at 12.87 1/2c., delivered. The Western Union Telegraph Co., which last week was in the market for about 2,750,000 lb. of copper, is reported to have placed this with a wire producer.

Tin.—A feature of the market is the scarcity of

spot Straits tin. Carload lots have been hard to obtain and even on some days it has been difficult to buy five-ton lots. There is also some scarcity of metal from steamer at dock and for May delivery, and it is hinted that the market for the latter position may yet corner itself. Sales in the week ended Saturday were very large, totaling about 2000 tons. Saturday was an active day, which was rather unusual, 300 tons of futures changing hands. Buying was mostly among dealers, though consumers bought some. Banca shipments, to and including May 21, are reported as about 1750 tons which is higher than a year ago, and Straits shipments are estimated at 4260 tons for the same period, which is smaller than a year ago. These facts are interpreted to indicate an increase in the world's visible supply at the end of May. The market today is very quiet with spot Straits tin quoted at 67.75c., New York, nominal. About 250 tons of futures was sold. Prices in London today were several pounds sterling higher than a week ago, with spot standard quoted at £295 15s., future standard at £287 5s., and spot Straits at £311 15s. The Singapore price today was £293 15s. Arrivals thus far this month have been 5290 tons, with 4985 tons reported afloat.

Lead.—Another reduction was made last week, Thursday, May 19, by the American Smelting & Refining Co., the New York contract price being reduced from 6.65c. to 6.50c. Just previous to this the outside market was lower than the price of the leading interest and today it is quoted at 6.15c., St. Louis. The market is very quiet with consumers well covered.

Zinc.—The tone is better and the price is a little higher than a week ago. Prime Western zinc, which was quoted nominally, May 17, at 6c., is now 6.05c. to 6.10c., St. Louis. While the quotation was still above 6c., St. Louis, and when it reached that point, very heavy buying took place, most of it for galvanizers. Today there is almost no demand, particularly in large quantities.

Metals from New York Warehouse Delivered Prices Per Lb.

Tin, Straits pig.....	69.25c. to 70.25c.
Tin, bar	71.25c. to 72.25c.
Copper, Lake	14.12 1/2c.
Copper, electrolytic	13.87 1/2c.
Copper, casting	13.37 1/2c.
Zinc, slab	7.00c. to 8.00c.
Lead, American pig.....	7.62 1/2c. to 8.62 1/2c.
Lead, bar	9.62 1/2c. to 10.62 1/2c.
Antimony, Asiatic	15.50c. to 16.00c.
Aluminum No. 1 ingot for remelting (guaranteed over 99 per cent pure)	29.00c. to 30.00c.
Babbitt metal, commercial grade.....	30.00c. to 40.00c.
Solder, 1/2 and 1/2	42.00c. to 43.00c.

Metals from Cleveland Warehouse Delivered Prices Per Lb.

Tin, Straits pig.....	72.75c.
Tin, bar	74.75c.
Copper, Lake	14.00c.
Copper, electrolytic	14.00c.
Copper, casting	13.25c.
Zinc, slab	8.00c.
Lead, American pig.....	7.50c.
Antimony, Asiatic	17.50c.
Lead, bar	9.50c.
Babbitt metal, medium grade.....	22.50c.
Babbitt metal, high grade.....	77.75c.
Solder, 1/2 and 1/2	43.50c.

Rolled Metals from New York or Cleveland Warehouse Delivered Prices, Base Per Lb.

Sheets—	
High brass	18.12 1/2c. to 18.87 1/2c.
Copper, hot rolled.....	21.75c. to 22.75c.
Copper, cold rolled, 14 oz. and heavier,	24.00c. to 25.00c.
Seamless Tubes—	
Brass	23.00c. to 24.00c.
Copper	23.75c. to 24.75c.
Brazed Brass Tubes.....	25.87 1/2c. to 26.87 1/2c.
Brass Rods	15.87 1/2c. to 16.87 1/2c.

From New York Warehouse

Delivered Prices, Base Per Lb.	
Zinc sheets (No. 9), casks.....	11.00c. to 11.25c.
Zinc sheets, open.....	12.00c. to 12.25c.

Non-Ferrous Rolled Products

Mill prices on bronze, brass, and copper products and on zinc sheets have not changed since April 7 and 25 respectively. Lead full sheets are still being quoted at the reduction of May 16.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	18.12 1/2c.
Copper, hot rolled.....	21.75c.
Zinc	9.75c.
Lead (full sheets).....	10.25c. to 10.50c.
Seamless Tubes—	
High brass	23.00c.
Copper	23.75c.
Rods—	
High brass	15.87 1/2c.
Naval brass	18.62 1/2c.
Wire—	
Copper	15.00c.
High brass	18.62 1/2c.
Copper in Rolls.....	20.62 1/2c.
Brazed Brass Tubing.....	26.12 1/2c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of the Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide.....	35.50c.
Tubes, base	45.00c.
Machine rods	34.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass	19.12½c.
Copper, hot rolled.....	21.75c.
Copper, cold rolled, 14 oz. and heavier.....	24.00c.
Zinc	11.00c.
Lead, wide	10.25c.
Seamless Tubes—	
Brass	24.50c.
Copper	25.25c.
Braced Brass Tubes.....	28.37½c.
Brass Rods	15.87½c.

Antimony.—The market is quiet with futures a little stronger than a week ago. Chinese metal for that position is quoted at 13.75c., with spot delivery at 13.50c., New York, duty paid. Today dealers were bidding 13.37½c. for July-August delivery.

Nickel.—Quotations are unchanged with wholesale lots of ingot nickel quoted at 35c., with shot nickel at 36c., and electrolytic nickel at 39c. per lb.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 25c. to 26c. per lb., delivered.

Non-Ferrous Metals at Chicago

May 24.—The copper market is dull and prices are lower. The demand for old metals is a trifle more active but prices are generally weaker. We quote in carload lots; Lake copper, 13.12½c.; tin, 69c.; lead, 6.30c.; zinc, 6.15c.; in less than carload lots, antimony, 14.50c. On old metals we quote copper wire, crucible shapes and copper clips, 10c.; copper bottoms, 9c.; red brass, 9c.; yellow brass, 7.25c.; lead pipe, 5c.; zinc, 3.50c.; pewter, No. 1, 34c.; tin foil, 43.50c.; block tin, 52c.; aluminum, 14c.; all being dealers' prices for less than carload lots.

REINFORCING STEEL

Awards of More Than 6500 Tons and New Projects Exceed 7600 Tons

Concrete reinforcing steel awards continue in fairly good volume, the week's total, as reported to THE IRON AGE, being upward of 6500 tons, including 1600 tons for Brooklyn sewer work. Pending projects, mostly under 500 tons each, total more than 7600 tons. Awards follow:

ORANGEBURG, N. Y., 520 tons, Rockland County Hospital, to Concrete Steel Co.
 BROOKLYN, 1600 tons, Sheepshead Bay sewer, to McClintic-Marshall Co.
 JERSEY CITY, 600 tons, foreign steel, approach to Holland Vehicular Tunnel, from United States Steel Construction Co., sub-contractor, to E. D. Giberson & Co.
 SPRINGFIELD, ILL., 100 tons of rail steel, cathedral, to Calumet Steel Co.
 CLEVELAND, 480 tons, warehouse for Ohio Bell Telephone Co., to Bourne Fuller Co.
 CHICAGO, 214 tons, Long Beach telephone exchange, to Concrete Engineering Co.
 CHICAGO, 100 tons of rail steel, hotel at 662 West Madison Street, to Calumet Steel Co.
 CHICAGO, 375 tons of rail steel, garage at 721 Plymouth Court, to Olney J. Dean & Co.
 CHICAGO, 900 tons, office building at 318 West Adams Street, to Concrete Engineering Co.
 CHICAGO, 100 tons, Three Links Lodge building, to Concrete Engineering Co.
 CHICAGO, 300 tons of rail steel, store building for Sears, Roebuck & Co., to Calumet Steel Co.
 DECATUR, ILL., 500 tons, viaduct for city of Decatur, to Laclede Steel Co.
 MEMPHIS, TENN., 100 tons, cotton compress building, to Laclede Steel Co.
 ST. LOUIS, 100 tons, Watson Street bridge for city of St. Louis, to Laclede Steel Co.
 OLYMPIA, WASH., 102 tons, eight bridges for State Road No. 2, to an unnamed jobber.
 TUCSON, ARIZ., 145 tons, storm sewer, to an unnamed interest.
 LOS ANGELES, 140 tons, warehouse on San Pedro and Clinton Streets for the Los Angeles Board of Education, to an unnamed jobber.

Old Metals, Per Lb., New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators, and the selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, heavy crucible.....	11.00c.	12.25c.
Copper, heavy and wire.....	10.75c.	11.75c.
Copper, light and bottoms.....	9.35c.	10.50c.
Brass, heavy	7.00c.	8.50c.
Brass, light	5.75c.	7.25c.
Heavy machine composition.....	8.75c.	10.125c.
No. 1 yellow brass turnings.....	7.50c.	8.25c.
No. 1 red brass or composition turnings	8.00c.	9.00c.
Lead, heavy	5.00c.	5.625c.
Lead, tea	4.00c.	4.50c.
Zinc	4.00c.	4.25c.
Sheet aluminum	14.50c.	16.50c.
Cast aluminum	14.50c.	16.50c.

LOS ANGELES, 150 tons, apartment building, 405 South Normandie Avenue, to an unnamed local jobber.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BOSTON, 280 tons, Y. W. C. A. building.
 NEW YORK, 500 tons, building for Bennett Bakery Co.; McCormick Co., Philadelphia, engineer.
 NEW YORK, 450 tons, Freedenberg Building, 216 East Forty-fifth Street; general contract not let.
 NEW YORK, 350 tons, Riverside Drive viaduct; P. T. Cox Contracting Co., general contractor.
 BROOKLYN, 315 tons, building for Ideal Chair Co., 1406 Metropolitan Avenue; general contract not let.
 PASSAIC, N. J., 600 tons, sewer, Spiniello Construction Co., general contractor.
 NEWARK, 500 tons, building for Merchants Refrigerating Co., 41 River Street; general contract not let.
 BUFFALO, public school No. 29, 250 tons; bids asked.
 BUFFALO, public school No. 6, 200 tons; bids asked.
 SAGINAW, MICH., 1000 tons, for sewer work.
 CLEVELAND, 2000 tons, warehouse for Distribution Terminal Co.
 SACRAMENTO, CAL., 195 tons, paving work for the State Highway Commission.
 OAKLAND, CAL., 258 tons, bridge over Calaveras River for Alameda County; bids by County clerk June 13.
 OAKLAND, 400 tons, for the Lafayette dam for the East Bay Municipal Utility District; bids July 15.
 SAN FRANCISCO, 195 tons, paving work for the State Highway Commission.
 SANTA ANA, CAL., 117 tons, bridge over San Juan Creek at Santa Ana for Orange County; bids being taken.

Student Officers Visit Pittsburgh Steel Mills

PITTSBURGH, May 24.—Headed by Col. H. B. Ferguson, commandant, and Col. I. J. Carr, assistant commandant of the Army Industrial College at Washington, 44 student officers of the college made a tour through iron and steel and other plants in this district the latter part of last week. The tour was arranged by procurement officers as a source of instruction to the student officers in connection with their course on industrial mobilization. Arriving on Thursday the party visited river locks and inspected the Carnegie Steel Co. by-product ovens at Clairton, Pa., and blast furnaces near by. At McKeesport, Pa., the party went through the seamless tube plant of the National Tube Co., and in the evening heard a lecture on steel and by-products of coal in Pittsburgh, where the party stayed at the Pittsburgh Athletic Club. On Friday visits were made to the Homestead plant of the Carnegie Steel Co., and the Westinghouse plants in East Pittsburgh. On Saturday the party visited the plant of the Dravo Contracting Co. and saw the launching of a barge while en route to Aliquippa, where one of the Jones & Laughlin Steel Corporation plants was visited. At Colfax the party inspected the Duquesne power plants and interconnection with the West Penn Power Co.

PERSONAL

Leo F. Reinartz, assistant general superintendent American Rolling Mill Co., Middletown, Ohio, who was recently elected chairman of the open-hearth conference,



LEO F. REINARTZ

held semi-annually under the auspices of the American Institute of Mining and Metallurgical Engineers, was born Aug. 3, 1888, in East Liverpool, Ohio. He was graduated in 1909 from the Carnegie Institute of Technology, Pittsburgh, as a metallurgical engineer, and entered the employ of his present company in July of that year. Until 1912 he served as a chemist, being made then assistant superintendent of the open-hearth department. Four years later he became superintendent of the East Side and Central Works open-hearth departments, and since 1923 has been assistant general superintendent in charge of steel plant and service operations. Mr. Reinartz is a member of the American Institute of Mining and Metallurgical Engineers and of the Iron and Steel Institute of Great Britain.

Charles L. Newcomb, general manager Dean Pump Works, Worthington Pump & Machinery Corporation, Holyoke, Mass., was the guest of the Hartford Kiwanis Club on May 19. He gave a talk on New England's business outlook.

W. C. Dickerman, vice-president American Car & Foundry Co., on May 19 delivered the last of a series of Fuller lectures at the Worcester Polytechnic Institute, Worcester, Mass.

D. R. Hoadley, secretary, a director and acting treasurer of the Novo Engine Co., Lansing, Mich., has announced his resignation, effective June 1. He became associated with the company 13 years ago as advertising manager. Later he was identified with the sales department and some time later was elected secretary. In 1920 he was sent to New York to take charge of the company's Eastern territory, but was recalled a year later to handle the financial and accounting departments. He plans to enter a new line of business.

R. N. Robertson, supervisor of power and mechanical work for the American Smelting & Refining Co., western division, has been appointed chief engineer for the Andrews-Bradshaw Co., Pittsburgh. He was graduated from Cornell University in 1905. He had been associated with the Smelting & Refining company for 20 years. A. L. Menzin has been added to the staff of the Andrews-Bradshaw Co., as director of research. He was graduated from the University of California in 1907, and was for some time consulting engineer for the Edge Moor Iron Co., Edge Moor, Del. More recently he has been chief engineer for the Tracy Engineering Co., San Francisco.

Matthew C. Brush has resigned from the board of directors of the Republic Iron & Steel Co., New York, and has been succeeded by G. N. Humphrey, vice-president of the M. A. Hanna Co., Cleveland.

G. E. Wearn has been appointed central station sales manager Westinghouse Electric & Mfg. Co., with headquarters in New York. Mr. Wearn has been with the company since 1916. Previously for three years he had been engaged as a consulting engineer on steam plant design. Before that he had been in the erecting and

testing division, Allis-Chalmers Mfg. Co., West Allis, Wis., and still earlier had been in the steam turbine department, General Electric Co.

Arthur A. Eakins has been appointed Boston district representative for the Standard Electrical Tool Co., Cincinnati, and will have headquarters at 12 Pearl Street, Boston. He has been engaged in electric tool sales work in that territory for 15 years.

Felix Wyner, for 11 years general superintendent of the Potter Machine & Tool Works, 79 East 130th Street, New York, and designer of the Potter precision bench lathe, has resigned that position to form the Wyner Machine Works, Inc., 133 East 114th Street, New York, which will do a general line of jobbing, tool and machine work. E. R. Schulz is secretary and treasurer of the company, and Mr. Wyner, president.

George W. Hughes, superintendent of blast furnaces for the Pittsburgh Steel Co. at Monessen, Pa., will sail on May 25 for Antwerp, Belgium, where he will represent Monessen at the annual convention of the Rotary International, June 4-10. After the convention Mr. Hughes will tour Germany, Switzerland and France by automobile.

F. C. A. H. Lantsberry, managing director William Jessop & Sons, Ltd., Sheffield, England, is visiting in the United States and Canada, making his headquarters at the company's New York office, 91 John Street.

William P. Snyder, Jr., president W. P. Snyder & Co., Pittsburgh, has been named a director of the Pitts-

W. F. Barnes, whose appointment to the presidency of the St. Louis Structural Steel Co., St. Louis, was announced in THE IRON AGE last week



burgh Board of Education to fill the vacancy caused by the resignation of Homer D. Williams, president, Pittsburgh Steel Co.

C. H. Seitz, general purchasing agent American Motor Body Corporation, Philadelphia, has resigned to take up sales work for the Trenton Malleable Iron Co., Trenton, N. J. He will be succeeded at the body corporation by P. J. Kelly.

J. H. Beall has been added to the Chicago sales force of the Reading Iron Co., Reading, Pa., and will have headquarters at 449 Conway Building, Chicago. He was previously engaged in the sale of heating equipment for a Middle Western gas company.

W. H. Lewis was reelected president of the Pennsylvania Engineering Works, New Castle, Pa., at the annual meeting held May 16. W. S. Wheeler was named vice-president and treasurer and S. B. Cleal, secretary.

Ernest Baxter has been appointed assistant to the president of the Sheffield Steel Corporation, Kansas City, Mo. J. C. Shepherd has been made general manager of sales and J. W. Anderson, assistant general manager of sales.

E. L. Parsons, formerly Boston district manager for

the Ramsey Chain Co., Boston, has been appointed representative in Wisconsin and northern Illinois for the Foote Brothers Gear & Machine Co., Chicago, and will make his headquarters at 49 East Wells Street, Milwaukee.

T. P. Gaylord, acting vice-president Westinghouse Electric & Mfg. Co., East Pittsburgh, has been elected president of the Chamber of Commerce of Pittsburgh. He has been associated with the Westinghouse company since 1899 and for 12 years was its Chicago district manager. He is a graduate of the University of Michigan, and also holds a degree from the Armour Institute of Technology, Chicago.

Charles McNichols has been appointed traffic manager American Bridge Co., with headquarters at Pittsburgh. He has been in the traffic department of the bridge company for 26 years, all of that time as division freight agent in charge of the Pittsburgh district. In the new position he will have charge of traffic for the entire company.

Charles D. Carey, who recently was elected president of the Pittsburgh Foundrymen's Association, is works manager of the Verona, Pa., plant, American Steel Foundries. This plant was formerly the Verona Steel Castings Co., a subsidiary of the Standard Steel Car Co., which late last year sold it to the American Steel Foundries. Mr. Carey was active head of it for nine years with the title of assistant to the president and was retained by the new owners. He was graduated from Princeton in 1908 and from Massachusetts Institute of Technology in 1910 as a mechanical engineer. After a year's association with Dr. P. H. Dudley, consulting engineer, New York Central Lines, he went with the Bethlehem Steel Co., being employed in the metallurgical and sales departments.



CHARLES D. CAREY

In 1914, he became an engineer physicist in the Bureau of Standards, Washington, and the following year, chief inspector for R. W. Hunt & Co., engineers, Pittsburgh, holding this position until 1918, when he resigned to go with the Verona Steel Castings Co. Mr. Carey has been active in the affairs of the Pittsburgh Foundrymen's Association for several years, serving last year as its vice-president. He was chairman of the committee that evolved the apprenticeship plan now in operation, in which Pittsburgh district foundries, in cooperation with the public schools in Pittsburgh and surrounding communities, are supplying the fundamentals in the training of the foundrymen of the future. Mr. Carey is one of the lecturers of the course.

R. Graf, for some years chief engineer of the Sperry Gyroscope Co., New York, and associated for several years with the De La Vergne Frick Consolidated Ice Machine Co., New York, is president of the newly organized Reliance Motor & Machine Co., Inc., Miami, Fla., which has been formed to do a general machine and engineering work, specializing in refrigeration and marine engineering.

H. L. Wilson, 514 National City Bank Building, Cleveland, has been appointed sales representative for the Geuder, Paeschke & Frey Co., Milwaukee. Arthur Dixon and Earl M. Hunker, Merchants Bank Building, Indianapolis, have been made representatives of the company in Indiana and Louisville, Ky.

Joseph S. Robinson has joined the sales department of the Superior Steel Corporation, Pittsburgh, in its Philadelphia office, which is under the direction of J. E.

Wetzel, Eastern sales manager. Mr. Robinson has lately been with the Norris-Hall Co., Philadelphia steel jobber, but prior to that was in the sales department of the Midvale Steel & Ordnance Co., before its purchase by the Bethlehem Steel Corporation.

W. H. Kissam, recently sales manager of the Cyclops Steel Co., 120 Broadway, New York, has been appointed New York district manager of the steel department of Henry Disston & Sons, Inc., Philadelphia.

James A. Gillis, for the past seven years at the Boston office of the American Steel & Wire Co., will shortly assume charge of the order and warehouse department of the company's New York office. Some 25 business associates and friends tendered Mr. Gillis a dinner on May 20, at the Boston Elks' Hotel.

Marshall T. Jones, former assistant chief of the iron and steel division, Department of Commerce, who recently was made acting chief of the electrical division of the department, has been made chief of the latter division.

J. S. McKesson, general sales manager Corrigan, McKinney Steel Co., Cleveland, has been elected vice-president of that company.

OBITUARY

FREDERICK MATHER WATERMAN, treasurer United States Steel Corporation, died on May 21 at his home in Rahway, N. J. He was



F. M. WATERMAN

born at Wheaton, Ill., in 1872, and attended public school at Westside, Iowa, later studying at the Iowa Business College, Des Moines. His early business training was gained at the Merchants' Loan & Trust Co., Chicago, where he was employed for 14 years. He became associated with the Steel Corporation in 1902 as cashier, and became acting treasurer some 15 months before the death of Richard Trimble in April, 1922. He was elected treasurer April 25, 1922. Mr. Waterman was also vice-president and treasurer of the Federal Steel Co., and a director of various subsidiary companies of the corporation.

C. F. WILLIAM BRAEGER, chief structural engineer for Graham, Anderson, Probst & White, Chicago architects, died May 16 after a short illness. He was 64 years old. Mr. Braeger was graduated from the Massachusetts Institute of Technology, and came to Chicago in 1893 to join the firm with which he was connected at the time of his death.

JAMES H. WARNER, purchasing agent for the Stamford Foundry Co., Stamford, Conn., died on May 19 at his home in that city. He was born in 1876 and entered the employ of the Stamford company in 1893. He became a stockholder in the company in 1912 and was elected a director in 1926.

JOHN BECKER, inventor of the Becker vertical milling machine, and formerly president of the Becker Milling Machine Co., which later was consolidated with the Brainard Milling Machine Co., Hyde Park, Boston, under the name of the Becker-Brainard Milling Machine Co., died at his home in Hollywood, Cal., on May 20, following an operation. He sold his interest in the Boston company in 1919.

National Institute of Chemistry to Meet This Summer

Selection of 35 foreign and American chemists as the first summer faculty of the new National Institute of Chemistry of the American Chemical Society is announced by Dr. George D. Rosengarten of Philadelphia, the society's president. The institute, founded "for the promotion of science in America," will hold its first session lasting one month, July 4 to 30, at Pennsylvania State College, and will bring together hundreds of scientific workers from the industries and the universities of the United States and Canada.

"American Machinist" Celebrates Fiftieth Anniversary

The *American Machinist* commemorates impressively its fiftieth year of publication in the anniversary number of May 19. This issue contains more than 620 pages, 80 of which are devoted to résumés of developments in machine shop and allied fields since the initial appearance of the *American Machinist* in 1877. Appropriate for the occasion, the cover is in gold.

Herbert Hoover, Charles M. Schwab, Gerard Swope, Glenn H. Curtiss, Dr. Dexter S. Kimball, and George K. Burgess are among the distinguished contributors. Interesting features also are articles devoted to progress in turning, drilling, planing, milling, press work, and production grinding. There is an article by J. Fletcher Harper, on the progress in heat treating, and another by Col. E. C. Peck, devoted to gaging, inspection and mass production. Other articles relate to gears, planning and scheduling, time and motion study, industrial relations and materials handling.

In "Fifty Years in Machine Tools," a picture section of 20 pages, something of the progress in machine tool design over the past 50 years is effectively set forth. A novel idea was reproducing in its entirety the first issue of the *American Machinist*, published in November, 1877, by Miller & Bailey, New York.

Bookings in Malleable Castings Gain

WASHINGTON, May 24.—The production of malleable castings in April totaled 59,225 net tons as against 66,372 tons in March, according to reports made to the Department of Commerce by 134 identical plants. Orders booked in April amounted to 56,326 tons, compared with 53,597 tons in March. A number of plants have been unable to report orders. In April the production of such plants was 6414 tons, while in March the output of such plants was 6912 tons. The monthly capacity of plants reporting in April was 106,163 tons, 55.8 per cent of capacity being operated. This compares with 106,698 tons in March, when operations were at the rate of 62.2 per cent. Shipments in April and March were 60,470 tons and 64,652 tons respectively.

Commercial Steel Castings

Bookings of steel castings in April are reported by the Department of Commerce at 78,282 net tons, or 59 per cent of shop capacity. This is lower than the March total of 82,488 tons and 62 per cent, and is lower also than in April last year, at 88,990 tons, or 67 per cent. The current figure is the smallest since November. Of the amount reported, railroad specialties accounted for 31,004 tons, or 52 per cent of capacity for those products, and miscellaneous castings 47,278 tons, or 65 per cent of capacity.

For the first four months of the year, bookings totaled 354,185 tons, or an average of 67 per cent of capacity, compared with 401,693 tons in the first four months of 1926, which represented 76 per cent of capacity. Production in the four months has held very close to bookings, having been 357,753 tons this year and 405,276 tons last year.

Production during the month, however, showed a wide divergence from bookings, having been 90,498 tons in April, or 68 per cent of capacity, the largest total except that for the preceding month since last

June. It compares with 97,256 tons in March and with 108,203 tons in April a year ago. Both in railroad specialties and in miscellaneous castings production in April was well ahead of bookings, the amount of railroad specialties turned out having been 36,693 tons and of miscellaneous castings 53,805 tons.

Show Increasing Interest in Bethlehem Employee Representative Plan

Growing interest of employees in the management of the Bethlehem Steel Corporation is shown by the increase in the number of those voting in the election of employee representatives to represent the men in their dealings with the corporation management. When the plan was inaugurated in 1918, 60 per cent of all employees participated, while this year 93 per cent cast votes. In 1918 the average service of all representatives was 8 yr. while this year it was 14 yr. Of the 306 men chosen in the elections 277 are American-born, and all of the others have declared their intentions to become citizens.

Becker-Type Ovens to Be Built at Montreal

The Montreal Coke & Mfg. Co. has contracted with the By-Product Coke Co. of Canada, Ltd., Canadian subsidiary of the Koppers Co., for the design and construction of a Becker-type by-product coke plant. The installation will consist of 59 Becker-type combination ovens, four Koppers gas producers, complete equipment for by-product recovery and a Koppers coke-handling plant. There will be annual carbonizing capacity for over 450,000 tons of coal. All of the gas from the plant will be distributed by the Montreal Light, Heat & Power, Consolidated.

Our Industries Entering a New Era

(Concluded from Page 1524)

two years have lacked the characteristic features of a boom period. Business men in most lines have displayed an unusual amount of caution. Such industrial expansion as has taken place has been accompanied by increasing rather than decreasing productive activity so that wage costs have been kept down. Business has had the unusual advantage of low interest rates, and there has been some check to the rise in taxes. Nevertheless, general profit margins have not been large or increasing. Moreover, the falling price level has stimulated efficiency, discouraged commodity speculation and kept the volume of commercial credit unusually low. All these, as well as other features of the situation, are more typical of subnormal general business than they are of the peaks of prosperity. The only real boom of the past two years has been in securities and real estate, and it is probable that this will give way to a real business expansion.

"If this takes place, it will depend largely upon business men and industrialists themselves whether the business cycle is going to be reinstated in its ancient glory. They have it largely in their own hands to determine the extent and duration of the ordinary industrial fluctuations that do not arise from exceptional European situations or such conditions as the floods and crop failures of this year. The domestic agricultural situation and European financial conditions are likely to be uncertain factors for a long time, but the business cycle in the old sense is a mere personification of the ignorance and lack of restraint of business men themselves, and it can be cured only when they cure themselves of these qualities. No outside agency can do this for them, nor can any dampers that are put upon them from the outside operate so effectively as their own intelligence and restraint. It is becoming more important every day, if we wish to remove the obsession of the business cycle, to lift the barriers and clear away the obstacles which Government now puts in the way of the intelligent organization and self-control of business."

Further Reduction in British Iron

Foreign Competition a Factor—Steel Makers Advance Plates and Shapes—European Cartel Reports—Russian Output Higher with Profit

(By Cable)

LONDON, ENGLAND, May 23.

Pig iron is weak and Cleveland makers have reduced prices 5s. (\$1.21) per ton in an effort to stimulate demand and check foreign imports. Hematite prices are weak and stocks large, but output has been curtailed by Giers, Mills & Co., Ltd., damping three out of the five Ayresome furnaces at Middlesbrough. Foreign ore is quiet with business mostly confined to deliveries against contracts.

Ferromanganese is active and competition between Norwegian-American interests and British sellers continues keen, consumers grasping the opportunity to buy while prices are low and makers endeavoring to advance prices to a more profitable level.

The British Steel Makers' Association has raised the minimum export prices on plates and sections 2s. 6d. per gross ton (60c.), although plate demand is poor and orders are scarcely obtainable even at the old quotations. Angles, however, are active and quoted above the minimum.

Tin plate is quiet, but inquiry is improving slightly,

as prices are likely to rise as a result of increased cost of foreign bars and the recent curtailment of output. Works, however, are reaching the end of order books and 70 tin plate mills closed over the week-end.

Galvanized sheets are moderately active in small lots, but the market continues firm, as makers are well booked with forward business. Light gage black sheets for Japan have been reduced 5s. per ton (\$1.21) and inquiry has improved, with some sales resulting.

Continental markets are displaying increased activity and prices are considerably higher, except for pig iron, which is now practically unsalable to British users. British consumers of semi-finished are fairly liberal purchasers and export demand for finished products is increasing. The German Raw Steel Syndicate has decided to refuse all export orders until June. Prices of the German Pig Iron Association for June are unchanged.

In Russia there were 63 furnaces in blast at the end of March. Russian production in March was 216,000 tons of pig iron, 290,000 tons of steel ingots and 240,000 tons of rolled products.

RUSSIAN OUTPUT INCREASES

Production Still Below Pre-War—Official Report on New Ore Field

BERLIN, GERMANY, May 10.—Russian official reports for the first half of the fiscal year, October, 1926, to March, 1927, show that in general the production program for this period has been fulfilled. Coal output in the last month of the half year was 25 per cent higher than the same month of 1926. Pig iron production in the half year was 1,452,000 metric tons compared with 1,013,000 tons in the corresponding half of the fiscal year 1925 to 1926. Steel ingot output was 1,772,000 tons against 1,370,000 tons in the first half of 1925 to 1926; rolled products 1,366,000 tons compared with 1,022,000 tons in the first half of last year.

The greatest increase in production is shown by South Russia, but the output there is still considerably less than the pre-war figure. The program for the entire fiscal year of 1926 to 1927 is 2,978,000 tons of pig iron, 3,465,000 tons of steel ingots and 2,592,000 tons of rolled products. The iron ore output in the first quarter of the current business year was 989,000 tons, which exceeded the production of the previous fiscal year by about 38 per cent. About 743,000 tons of this was from the Krivoi Rog mines.

Financial returns of the State metal industries in the business year 1925 to 1926, figured at 51.4c. to the ruble, show net profits on iron and steel production of 10,600,000 rubles (\$5,448,400), on general machine construction 5,500,000 rubles (\$2,827,000) and a loss of 4,200,000 rubles (\$2,158,800) on agricultural machinery and 4,540,000 rubles (\$2,333,560) on shipbuilding.

Both the Don Coal and Southern Steel corporations

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.85 per £ as follows:

	£1	2s.	to £1	2½s.	\$5.33	to	\$5.46
Durham coke, del'd.	1	2	to 1	2½	5.33	to	5.46
Bilbao Rubio ore†	1	2	to 1	2½	17.57*		
Cleveland No. 1 fdy.	3	12½			16.97*		
Cleveland No. 3 fdy.	3	10			16.73*		
Cleveland No. 4 fdy.	3	9			16.61*		
Cleveland No. 4 forge	3	8½			18.18	to	18.30
Cleveland basic	3	15	to 3	15½	19.40		
East Coast mixed	4	0			19.52		
East Coast hematite	4	0½			37.58	to	40.01
Rails, 60 lb. and up.	7	15	to 8	5	35.16	to	36.37
Billets	7	5	to 7	10	58.20		
Ferromanganese	12	0			60.62		
(export)	12	10			30.31		
Sheet and tin plate					4.66	to	4.72
bars, Welsh	6	5					
Tin plate, base box	0	19¼	to 0	19½	66.68	to	67.90
Black sheets, Japanese specifications.	13	15	to 14	0*			
					C. per Lb.		
Ship plates	7	12½	to 8	0	1.65	to	1.73
Boiler plates	11	0	to 11	10	2.38	to	2.49
Tees	8	7½	to 8	17½	1.81	to	1.92
Channels	7	12½	to 8	2½	1.65	to	1.76
Beams	7	7½	to 7	17½	1.50	to	1.70
Round bars, ¾ to 3 in.	8	0	to 8	10	1.73	to	1.84
Steel hoops	10	10	to 11	0	2.28	to	2.39
Black sheets, 24 gage	11	5			2.44		
Galv. sheets, 24 gage	14	15			3.19		
Cold rolled steel strip, 20 gage, nom.	14	0			3.03		

*Export price, 6d. (12c.) per ton higher.

†Ex-ship, Tees, nominal.

Continental Prices, All F.O.B. Channel Ports

	£3	2s.	to £3	2s.	\$15.03	to	\$15.28
Foundry pig iron: (a)					15.03	to	15.28
Belgium	3	2	to 3	3	15.03	to	15.28
France	3	2	to 3	3	15.03	to	15.28
Luxemburg	3	2	to 3	3	15.03	to	15.28
Basic pig iron:							
Belgium	3	2	to 3	3	15.03	to	15.28
France	3	2	to 3	3	15.03	to	15.28
Luxemburg	3	2	to 3	3	15.03	to	15.28
Coke	0	18			4.37		
Billets:							
Belgium	4	10	to 4	11	21.82	to	22.06
France	4	10	to 4	11	21.82	to	22.06
Merchant bars:					C. per Lb.		
Belgium	4	15	to 4	16	1.04	to	1.05
Luxemburg	4	15	to 4	16	1.04	to	1.05
France	4	15	to 4	16	1.04	to	1.05
Joints (beams):							
Belgium	4	16	to 4	17	1.05	to	1.07
Luxemburg	4	16	to 4	17	1.05	to	1.07
France	4	16	to 4	17	1.05	to	1.07
Angles:							
Belgium	4	15			1.04		
¼-in. plates:							
Belgium (nominal)	6	0	to 6	1	1.32	to	1.33
Germany (nominal)	6	0	to 6	1	1.32	to	1.33
¾-in. ship plates:							
Belgium	5	17			1.28		
Luxemburg	5	17			1.28		
Sheets, heavy:							
Belgium	6	3	to 6	4	1.35	to	1.36
Germany	6	3	to 6	4	1.35	to	1.36

(a) Nominal.

have placed orders in Germany for mine and blast furnace equipment. The coal company has ordered nine turbines in Germany, payment for which will be made from the export credit of 3,000,000 marks (\$710,550).

A plan for a considerable increase in the production of tractors has been decided upon and a new plant with an annual capacity of about 10,000 tractors is to be erected at Stalingrad. The Krasni Putilovetz works near Petrograd is to be increased in capacity to produce 5000 tractors and 40,000 replacement parts a year and the Krasni Progress works will be equipped to produce 1000 tractors a year. Measures to reduce the cost of product, said by Mr. Rykoff in a recent speech to be more than 500 per cent above American costs, have been attempted.

The Promizdat has issued a report on the exploration of the iron deposits in the province of Kursk. The Kursk deposits are said to extend for about 200 miles and the average iron content on sections analyzed shows about 50 per cent. On the basis of an average iron content of 30 per cent in this field there is from 20,000,000 to 30,000,000 tons of iron.

The *Ekonomicheskaya Zhizn*, official publication, states that the Cooper and the Siemens-Bau Union plans for the development on the Dnieper River of hydro-electric power vary considerably. There is a shortage of labor in this district and housing work and road improvement will be necessary before the actual plant construction can begin. Work on the dams will begin this year, but it is dependent upon deliveries of foreign equipment.

The plan for a railroad of about 1400 versts (924 miles) joining Siberia and Turkestan have been approved and the cost is estimated at 162,000,000 rubles (\$83,268,000).

EUROPEAN CARTEL REPORTS

Statement for First Half Shows Overproduction by Germany, Belgium and the Saar

HAMBURG, GERMANY, May 5.—The production and balance sheet of the International Steel Cartel for the first half year, beginning October, 1926, and ended March, 1927, shows further increase in the overproduction of Germany. The total quota for the first quarter was set at 29,267,000 tons for all members, for the second quarter at 27,787,000 tons and for the third it has again been set at 29,267,000 tons, further increased 2,179,210 tons by the entrance of Czechoslovakia, Austria and Hungary as members. The following table shows the quota, the actual production and the amount of penalty or payment for underproduction of the various members of the cartel:

Member	Output, Metric Tons	Quota, Metric Tons	Penalty Over Quota	Payment Under Quota
Belgium	1,882,505	1,661,294	\$884,844	.....
Germany	7,693,599	6,182,579	6,044,080	.....
Luxemburg	1,180,526	1,184,400	.....	\$7,748
France	4,202,200	4,437,317	.....	470,334
Saar district...	932,023	824,910	428,452	.....

As each member pays into the treasury of the cartel \$1 per ton for every ton of steel produced and receives the amount remaining in the treasury after all disbursements, final distribution will show that Germany paid into the cartel in production charges and fines \$13,737,679 and received \$9,831,239. France paid \$4,202,200 and received \$7,099,960, Belgium \$2,767,349 and received \$2,632,228, Luxemburg \$1,180,526 and received \$1,890,150 and the Saar \$1,360,475 and received \$1,316,570. Protest by Belgium and Germany at the present arrangement, which seems to bring a permanent bounty to France for underproduction, is expected at the next meeting of the cartel. The meeting in Luxemburg May 3 and 4 was without result. Germany agreed to relinquish the demand for an increase of allotment, but Belgium and France insisted upon an increase of 10 per cent in their quotas. The Germans point out that while a small increase in the Belgian quota is comprehensible, it is impossible to understand why France, which has been unable to fulfill its quota should demand another 10 per cent increase. The next meeting will be held at Brussels in June.

IRON FROM NETHERLANDS

United States a Main Customer—American Tin Plate up Against Price Situation

GROWTH of the blast furnace industry in Holland is described in Trade Information Bulletin No. 470, under the title "Iron and Steel Trade and Industry of the Netherlands," prepared by Commercial Attaché Jesse F. Van Wickle, The Hague, and Joseph W. Palmer, Iron and Steel Division, Department of Commerce. The success of the Netherlands in reviving pig iron production, brought about by World War exigencies, is pointed out, figures showing the expansion of exports, with the United States as the principal market. The output comes from the Royal Dutch Blast Furnace & Steel Works, which was organized to make both pig iron and steel; but conditions were found to be such as to make the local manufacture of steel unprofitable.

Iron was first poured by this interest in January, 1924, the first in 40 years made in the Netherlands. It is estimated that during the fiscal year ended March 31, 1927, the two Dutch blast furnaces produced about 200,000 metric tons. The concern was organized with a capital of 17,500,000 florins through public subscription, and Government aid to the extent of 7,500,000 florins. The present capitalization is 35,000,000 florins.

One blast furnace was built near Amsterdam and began operations in 1924. A second furnace adjoining was blown in on Jan. 8, 1926. The capacity of the first furnace is 300 tons and of the second 350 tons daily. Both furnaces are of American design. Iron ore comes from Sweden, France, Spain and Algiers, long-term contracts having been made with mines in all four of these countries. For its coal the Dutch company, known to the trade as "Hoogovens" (literally, "high furnaces"), has a source of supply in the Limberg mines and it also has acquired control of several German mines, which assure sufficient coal for many years to come. The limestone comes from Belgium, where the Dutch own an important pit.

Imports of iron and steel products by the Dutch in 1926 totaled 1,015,566 metric tons, while exports amounted to 468,186 tons. Germany supplied 730,883 tons, or 72 per cent of the imports; Belgium, 179,580 tons, 17.5 per cent; Great Britain, 21,921 tons, 2 per cent; France, 60,098 tons, 6 per cent, and the United States, 2222 tons, 0.22 per cent. So far as the iron and steel imports are concerned, aside from tin plate, the United States did not benefit from conditions brought about through the British coal strike. The report says Welsh tin plate holds the market solely on price, last year's imports from Great Britain reaching 34,067 tons, while 6117 tons came from Germany and 2536 tons from the United States.

Tin Plate Quality vs. Price and Terms

"It is claimed that German tinning is heavier, which may be due to the reported inability of German plate mills to work down to a satisfactory thin coating," says the bulletin. "At any rate, it seems that German plate is preferred in some quarters, especially for printing and decorative purposes, as scratches on the Welsh plate result in an unsatisfactory finished job."

As a rule, it is stated, American tin plate can be sold in the Netherlands in quantities only when Welsh production is curtailed. "Certain users recognize the fact that American tin plate works more smoothly in automatic forming machinery than either Welsh or German plate. But since machines are not usually run at high speeds, and the time lost in removing a defective sheet seems not to assume great importance, it is not to be expected that any considerable number of Dutch can makers will be willing to pay a heavy premium for American plate," it is pointed out.

"Another thing which militates against American plate is the English practice of giving 14-day terms after arrival, whereas United States makers invariably demand cash against documents. The English are said plate, but this should not be considered as a disadvantage to replace brittle sheets which break in forming. American plate is claimed to be less bright than Welsh plate in general usage."

Machinery Markets and News of the Works

RAILROADS BUY TOOLS

Union Pacific Places Orders of About \$100,000—Santa Fe Buying

Chicago Market More Active in Several Directions but Machinery Business Generally Is Slow

ORDERS placed within the week by the Union Pacific Railroad at Chicago total about \$100,000 and the Santa Fe has begun the placing of orders against a pending list of considerable size. Miscellaneous sales to industrial plants in the Chicago district are more numerous and there is also a larger inquiry from that

source. In general, however, machine tool buying is slow and somewhat uneven. A slight improvement was noted in the volume of orders received by some of the tool builders in the Cincinnati territory.

An automobile manufacturer has bought 12 lathes and other equipment from Cincinnati tool companies, but otherwise orders from the motor car industry have been light. Business has been developed principally among widely scattered sources in the industrial field. It is probable that the total volume of sales in May will show no marked deviation from that of last month.

The Cleveland Board of Education will take bids May 31 on about a dozen metalworking and woodworking machines for the Thomas A. Edison School, that city.

New York

NEW YORK, May 24.

MACHINE tool business in this district continues to pursue a slow and somewhat uneven course. The volume of business is not materially changed from that of the past few weeks, but prospects are fewer and the outlook is for only moderate activity through the summer. Among the week's orders were the following: A Pittsburgh manufacturer, 6-ft. radial drill; a Connecticut brass company, cold sawing machine; a Pittsburgh steel company, a guillotine shear; a New York manufacturer, vertical drilling machine; a steel company in Birmingham, vertical drilling machine; Texas & Pacific Railroad, 20-in. lathe; a type-writer plant at Hartford, Conn., bench lathe; a Newark manufacturer, vertical drilling machine; a Providence, R. I., machine tool company, a deep hole drilling machine and a thread milling machine; a Lansing, Mich., motor plant, an automatic lathe; a die manufacturer in Chicago, a die sinker; a tool company at Rockford, Ill., a thread milling machine; a Columbus, Ohio, bolt manufacturer, an automatic milling machine; a Buffalo manufacturer, a 13-in. lathe.

The Diamond & Frazer Iron Works, Inc., 830 East 147th Street, New York, has purchased property, 100 x 100 ft., at Whittier Street and the Eastern Boulevard, as a site for a proposed one-story plant.

The Packard Motor Car Co., 1580 East Grand Boulevard, Detroit, is having revised plans drawn for a new service, repair and sales building at Albany, N. Y., to cost upward of \$100,000, for which bids will soon be asked on a general contract. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer.

The Friestedt Foundation Co., 244 Madison Avenue, New York, contractor for underpinning and other heavy structural work, has acquired property at Long Island City, totaling 20,000 sq. ft., as a site for a branch equipment repair, storage and distributing plant.

Berlinger & Kaufman, 66 Fifth Avenue, New York, architects, have filed plans for a two-story automobile service, repair and garage building, 80 x 100 ft., at 547-55 Ninety-second Street, Brooklyn, to cost approximately \$100,000 with equipment.

The Brooklyn Edison Co., Pearl and Willoughby Streets, Brooklyn, has authorized plans for extensions in its steam-operated turbo-generating station at Hudson Avenue and the East River, including the installation of a 135,000-hp. generating unit and auxiliary machinery, to cost in excess of \$5,000,000.

The Commission of Mental Hygiene, Capitol Building,

Albany, N. Y., is asking bids until June 8 for refrigerating equipment for the administration group, Letchworth Village, Thiells, N. Y. Plans and specifications at the office of the State architect, Capitol Building, Albany.

The Circle Auto Top & Painting Co., 509 West Fifty-sixth Street, New York, manufacturer of auto tops, frames, etc., has leased space in the building at 503 West Fifty-sixth Street for expansion.

The Board of Education, Union Free School District No. 1, Willsboro, N. Y., contemplates the installation of manual training equipment in its proposed two-story high school estimated to cost \$175,000. Pember & Demers, 24 James Street, Albany, N. Y., are architects.

Abraham Schwartz, 103 Park Avenue, New York, architect, has taken out a permit for a six-story automobile service, repair and garage building, 95 x 125 ft., at 1316-24 Flushing Avenue, Brooklyn, to cost about \$175,000 with equipment.

The Continental Iron Works, West and Calyer Streets, Brooklyn, manufacturer of corrugated furnaces, furnace fronts, etc., is discontinuing business and will dispose of its property and equipment. The American Welding Co., 30 Church Street, New York, will take over that portion of the business devoted to Morison furnace equipment, and will continue as a branch of its operations.

The Cities Service Gas Co., 60 Wall Street, New York, an interest of Henry L. Doherty, operating natural and other gas properties, pipe lines, etc., in Missouri, Oklahoma, Kansas and neighboring territory, is disposing of a bond issue of \$25,000,000, a portion of the proceeds to be used for expansion and improvements.

The Board of Education, Nyack, N. Y., is said to be planning the installation of manual training equipment in its proposed two-story school estimated to cost more than \$500,000, for which plans will be drawn by Ernest Sibley, Bluff Road, Palisade, N. J., architect.

The Westchester Lighting Co., South Broadway, Yonkers, N. Y., has plans for a one-story addition to its power house on the Saw Mill River Road, to be equipped with mechanical exhausters and auxiliary machinery.

The Board of Estimate, Municipal Building, New York, Chief Engineer Tuttle, in charge, is considering the purchase of property on the East Island, Jamaica Bay, L. I., as a site for a municipal airport. A hearing has been called on June 2 for the proposition. It is estimated to cost more than \$1,000,000, with hangars, repair shops and other structures.

The Automatic Movie Display Corporation, 130 West Forty-sixth Street, New York, manufacturer of automatic motion picture machines and parts, has concluded negotiations for the purchase of the plant and business of the American Projecting Co., 6227 Broadway, Chicago, manufacturer of projectors, etc., and will operate as a subsidiary. It is understood that the Chicago works will be continued for projector manufacture, supplies, etc.

The Wallace & Tiernan Co., Mill Street, Belleville, N. J., manufacturer of purification machinery, has awarded a general contract to J. Sutherland, Inc., 133 South Fifteenth Street, Newark, for a four-story addition, to cost \$150,000 with machinery. Fletcher-Thompson, Inc., 542 Fairfield Avenue, Bridgeport, Conn., is architect and engineer.

The New Jersey Power & Light Co., Dover, N. J., has secured permission for a bond issue to total \$433,000, and common stock issue in amount of \$500,000, a portion of the proceeds to be used for extensions and improvements. The company is operated by the General Gas & Electric Co., 50 Pine Street, New York.

The Public Service Railway Co., Public Service Terminal, Newark, has filed plans for a one-story bus service, repair and garage building, to cost in excess of \$70,000 with equipment.

The Newark Gear Cutting Machine Co., 65 Prospect Street, Newark, has awarded a general contract to Enstice Brothers, 111 Academy Street, for a two-story addition, 48 x 95 ft., to cost approximately \$50,000 with equipment. Bishop & Scudder, 31 Clinton Street, are architects and engineers.

In connection with its new junior high school on Georges Avenue, on which construction has been begun, the Board of Education, Linden, N. J., plans the installation of a speed lathe, tool grinder, planer and jointer, universal saw bench, and complete line of wood-working machinery. The structure will cost in excess of \$500,000.

The Treglown Building Corporation, 423 Park Avenue, Plainfield, N. J., has filed plans for a three-story automobile service, repair and garage building, 118 x 150 ft., to cost upward of \$125,000 with equipment. Foundations will be arranged for three additional stories later.

The Manufacturers' Device Co., 360 Thomas Street, Newark, has plans for a new plant to cost about \$200,000 with equipment, and will soon begin superstructure.

J. R. Shays, Jr., Inc., 100 Greenwich Street, New York, has been appointed selling agent in the New York district for the American High Speed Chain Co., Indianapolis. Stocks of small drives will be carried by the Shays organization for immediate delivery, and quick factory delivery may be had on other products.

The Solidhed Tack Co. and the Hawkes-Jackson Co., both of New York, manufacturers of tacks, have been consolidated under the name of the Solidhed Co., Inc., and the offices and factory removed to 88 River Street, Hoboken, N. J.

Generalair Beacons, Inc., 41 East Forty-second Street, New York, has been organized as a subsidiary of General Airways, Inc., of the same address, to manufacture an all-metal landing beacon and landing field marker for aircraft. The product will be manufactured under contract, but some raw materials will be bought directly by the company.

Chicago

CHICAGO, May 23.

THE Santa Fe railroad is closing on some tools on its list, having placed a 36-in. planer and six lathes. The Union Pacific has purchased \$100,000 worth of machine tools. New inquiry from the railroads is light, and includes a request for prices on a No. 3 Ajax, or equivalent, hot saw and burring machine by the Chicago, Milwaukee & St. Paul. Sales to industrial plants have been more numerous the past week, and inquiry gives promise of increased orders. As a whole, this market is showing more activity in practically all directions. Manufacturers of machine tools are not heavily engaged, and deliveries are usually satisfactory. A number of local buyers are interested in used tools, and several dealers report sales of rebuilt planers.

The Champion Machinery Co., Joliet, Ill., will erect a shop addition to cost \$10,000.

The Greenlee Foundry Co., 4600 West Fourteenth Street, Chicago, suffered a loss by fire May 16 amounting to \$55,000.

The Peoples Gas Light & Coke Co., 122 South Michigan Avenue, Chicago, will build a three-story electrical distribution building at 3504 South Crawford Avenue, to cost \$80,000.

The Peerless Ice Machine Co., 503 South Jefferson Street, Chicago, is completing plans for a new two-story factory, to cost approximately \$90,000 with equipment. Koenigsberg & Weisfeld, 155 North Clark Street, are architects.

The Montana Power Co., Butte, Mont., has arranged for a bond issue of \$12,500,000, a portion of the proceeds to be used for extensions in power plants and system. John D. Ryan is president.

The City Council, Marshall, Minn., is arranging a call

for bids for a proposed municipal electric light and power plant, estimated to cost \$175,000 with machinery. The Pillsbury Engineering Co., 2344 Nicollet Avenue, Minneapolis, Minn., is engineer.

The Imperial Clock Co., Berwyn, Ill., is said to be planning the erection of a one-story factory to cost approximately \$25,000 with equipment. R. Guy Kneedler is vice-president in charge.

The Northern States Power Co., 15 South Fifth Street, Minneapolis, Minn., is said to have plans in progress for a proposed hydroelectric generating plant on the St. Croix River, near Nevers, Wis., with initial output of 28,000 hp. It is estimated to cost close to \$5,000,000 with transmission system. The company is also planning a similar generating station on the Mississippi River, in the vicinity of Monticello, Minn., to cost more than \$9,000,000 with transmission lines.

The Miller Cabinet Shops, Inc., 2171 Clyburn Avenue, Chicago, has leased a portion of the building at 330-52 East Ohio Street, totaling about 30,000 sq. ft. of floor space, for factory expansion.

Ovens, power equipment, conveying and other machinery will be installed in the proposed two-story plant to be constructed by the Campbell Baking Co., Waterloo, Iowa, estimated to cost \$165,000. W. A. Peterson, Bakeries Service Corporation, 285 Madison Avenue, New York, is architect.

The C. H. Wills Motors Corporation, Minneapolis, Minn., has taken over a factory at 1030 Ramsey Street, and will establish a plant for the manufacture of automobile buses and motor trucks, parts, etc. The company has recently acquired the property and business of the Wilcox Trux, Inc. motor trucks, and will consolidate with its organization.

The Board of Education, Anaconda, Mont., is considering the installation of manual training equipment in a new two-story junior high school to cost \$200,000, for which plans will be drawn by Shanley & Baker, Great Falls, Mont., architects.

The Crystal Ice & Storage Co., 130 North First Street, Fort Dodge, Iowa, has plans for a one-story ice-manufacturing plant to cost about \$40,000 with equipment.

The William Foster Metal Products Co., 217 South Fourth Street, Springfield, Ill., has purchased a three-story building at 500 North Fourth Street and will occupy for a new plant. Expansion will be made in the sheet metal and roofing departments.

The Chicago Smelting & Refining Corporation, 2457 South Loomis Street, Chicago, advises THE IRON AGE that a statement in our issue of April 14 that L. C. Robinson is a partner in the business is an error. Mr. Robinson, it is stated, has not been connected with the business since it became a corporation in October, 1923.

The Lennox Furnace Co., Marshalltown, Iowa, is completing a \$25,000 steel fabricating department addition and a \$10,000 warehouse at its plant.

The Federal Electric Co., 8700 South State Street, Chicago, has announced the manufacture of a line of electric ranges. Six models are now being made, all of range frame materials, reinforced by angle iron. On two of the models the oven door frame, hinges and handles are of malleable iron, while nickel plating is used on these parts on the other models.

Philadelphia

PHILADELPHIA, May 23

PLANS have been filed by the Manayunk Wagon Works, 4224 Main Street, Philadelphia, for a one-story addition, reported to cost about \$20,000, for which a general contract has been let to F. V. Radomski, 4329 North Sixteenth Street.

The American Ice Co., City Center Building, Philadelphia, is arranging for a new stock issue to total about \$4,200,000, a portion of the fund to be used for expansion and improvements in ice-manufacturing and cold storage properties, and for the purchase of the Commonwealth Ice Co., New York, and development of additional facilities in the latter territory.

The Olney Foundry Co., 180 West Duncannon Street, Philadelphia, has taken out a permit for a one-story addition to cost about \$25,000.

Daniel J. Keating, 2042 Rittenhouse Street, Philadelphia, plumbing and heating equipment, is completing plans for a new two-story and basement plant, 70 x 100 ft., to cost close to \$30,000. The Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

The Sun Oil Co., Finance Building, Philadelphia, operating oil refineries at Marcus Hook, Pa., and other points, has arranged for a preferred stock issue of \$4,500,000, a portion of the fund to be used in connection with an expansion and improvement program now under way at Mar-

The Crane Market

THERE has been increased activity in both the overhead and locomotive crane fields. A number of locomotive cranes have been purchased in the past week and inquiry is much improved. The list of cranes and shovels for the Amtorg Trading Co., 165 Broadway, New York, is expected to close shortly. The Baltimore & Ohio Railroad, which has closed on two gasoline operated standard gage locomotive cranes is not expected to buy the other two cranes on its list until these have been tested for some time. A list of hand power transfer cranes and electric hoists is reported in the market. The New York Edison Co. is understood to have made its recommendation to the Kenwell Contracting Co., New York, on the purchase of a 5-ton, 98-ft. span electric crane for the Bronx service station and purchase is expected in the next few days. The New York Central is taking bids on two 20-ton locomotive cranes. The Stupp Brothers Bridge & Iron Co., St. Louis, is asking for prices on a used 10-ton, 75 to 80-ft. span, double trolley overhead crane, either alternating or direct current.

In the Pittsburgh district the Carnegie Steel Co. is expected to close on three large open-hearth furnace cranes for Duquesne some time this week and it is understood that recommendation has been made on the nine cranes for the Lorain works of the National Tube Co.

Among recent purchases are:

Baltimore & Ohio Railroad, Baltimore, two 25-ton, gasoline driven, standard gage locomotive cranes, one from the American Hoist & Derrick Co. and one from the Brown Hoisting Machinery Co.

Patrick McGovern, Inc., 50 East Forty-second Street, New

York, two 15-ton, crawl-tread locomotive cranes, making a total of five purchased recently from the Industrial Works.

Tannin Corporation, 100 East Forty-second Street, New York, a 15-ton gasoline driven, standard gage locomotive crane for Wilmington, Del., from the American Hoist & Derrick Co.

Southern Pacific Co., San Francisco, a 25-ton locomotive crane and a special gasoline operated crane for a flat car from the American Hoist & Derrick Co.

Public Service Production Co., Newark, N. J., a 65-ton, 4-motor, overhead traveling crane from the Milwaukee Electric Crane & Mfg. Corporation.

Decarie Incinerator Co., Philadelphia, a 2-cu. yd. bucket crane for an incinerator in Philadelphia and a 2½-ton, double trolley overhead crane for an incinerator in Providence, R. I., from a Northwestern builder.

Delaware, Lackawanna & Western Railroad, New York, a 2-ton, 3-motor overhead crane for Scranton, Pa., from an unnamed builder.

General Electric Co., Schenectady, N. Y., a 10-ton overhead crane for Pittsfield, Mass., from the Niles Crane Corporation.

Western Gas Construction Co., Fort Wayne, Ind., a 15-ton and a 5-ton, 60-ft. span overhead cranes from the Shaw Electric Crane Co.

Dolomite Corporation, Cleveland, a 15-ton electric traveling crane from the Milwaukee Electric Crane & Mfg. Corporation.

ous Hook, and for other extensions. J. Howard Pew is president.

O. P. Schuman, 2226 North Sixth Street, Philadelphia, will soon begin the erection of a one-story machine shop, 36 x 60 ft., for which a general contract was recently let to W. F. Chapman, 1805 West Venango Street.

The Paramount Electric Supply & Fixture Co., 251 Market Street, Philadelphia, has purchased the building at 930 Arch Street for about \$100,000, and will use for expansion.

D. B. Flower, 1217 Spring Garden Street, Philadelphia, railroad equipment and supplies, has plans under way for a new one-story factory, 45 x 150 ft., at Morrisville, Pa., to cost about \$30,000 with equipment. T. B. Stockham, Stockham Building, Morrisville, is architect.

The Board of Education, Princeton, N. J., contemplates the installation of manual training equipment in a proposed high school for which an appropriation of \$750,000 is being arranged. Ernest Sibley, Bluff Road, Palisade, N. J., is architect.

The Endura Mfg. Co., Eleventh Street and Washington Avenue, Philadelphia, manufacturer of paper of heavy grade, has acquired the plant of the Durham Paper Co., Durham, Pa., for expansion.

The Borough Council, Lansdale, Pa., is planning an early call for bids for a proposed pumping plant for the municipal sewage system. The entire project will cost about \$75,000. Albright & Mebus, 1502 Locust Street, Philadelphia, are consulting engineers. H. H. Metz, Citizens' Bank Building, is borough engineer.

The plant of the Steel Products Co., Lancaster, Pa., comprising a group of buildings on a tract of 13 acres, heretofore held by the General Motors Corporation, has been purchased by the Armstrong Cork Co., Linoleum Division, and will be occupied by that company in the future.

The Board of Education, Cornwall, Pa., is considering the installation of manual training equipment in a proposed two-story high school to cost about \$175,000, for which plans are being drawn by Ritter & Shay, Packard Building, Philadelphia, architects.

The Wildman Mfg. Co., Norristown, Pa., manufacturer of textile machinery, has awarded a general contract to the Austin Co., Philadelphia, for a one-story, sawtooth roof type addition to cost more than \$65,000. It is understood that the new unit will house equipment heretofore used by the Richter Machine Co., Van Kirk and Erdrich Streets, manufacturer of kindred machinery, recently acquired.

The Cincinnati Electrical Tool Co., Cincinnati, has removed its Philadelphia office to larger quarters at 716 North Sixteenth Street. H. M. Reynolds is district manager.

The William Cramp & Sons Ship & Engine Building Co., Philadelphia, has authorized the sale of its properties heretofore devoted to marine construction and repair work, including local shipbuilding shops and equipment; the Kensington drydock, with repair and yard facilities; and other property, including Petty's Island, in the Delaware River,

opposite the Philadelphia shipyards. The Edward M. P. Murphy Co., Inc., 165 Broadway, New York, will be in charge of the liquidation.

New England

Boston, May 23.

MACHINE tool business among local dealers is not developing this month as rapidly as was anticipated, buying during the first week in May apparently being only a spurt. Sales of new tools the past week in this territory were in small volume, consisting mostly of bench equipment. A few used lathes, drilling machines and smaller tools were sold, one to a customer, in and about Boston, at low prices. New inquiries are almost as scarce as actual bookings. There is still considerable business pending, however, but the chances of closing appear somewhat remote. New England machine tool builders generally report a noticeable falling off in new orders. Many, nevertheless, are fairly busy on old orders, but unless sales increase, shorter weekly working schedules at some plants may be announced.

The Worcester Wire Works, Inc., Worcester, Mass., will erect a one-story concrete and wood manufacturing plant.

Fay, Spoffard & Thorndike, 44 School Street, Boston, engineers, have closed bids on a one-story, 75 x 181 ft., manufacturing plant for the Warren Telechron Co., Holmes Avenue, Ashland, Mass.

By order of Walter Powers, receiver in bankruptcy, the business and equipment of the Standard Thermometer Co., Roxbury district, Boston, thermometers and speedometers, was sold at public auction May 23.

The wood-working plant of the E. B. Estes & Sons Co., Pittsfield, Mass., including stock, equipment, good will, etc., last week was sold at public auction to a new firm to be known as E. B. Estes & Sons, Inc.

C. L. Tolles, president Jewell Belting Co., and James B. Gray, Chicago, Western representative of that company, are interested in the Hartford Belting Co., Hartford, Conn., which recently filed a certificate of organization. The new company plans to become operative when the Jewell Belting Co. is terminated, probably next fall.

The Thomson Electric Welding Co., Lynn, Mass., will discontinue its Cleveland office, effective May 28, and the new district office will be located at 810 Mercantile Library Building, Cincinnati.

The Spencer Turbine Co., 486 New Park Avenue, Hartford, Conn., has begun the erection of a one-story addition to cost \$55,000 with equipment. Buck & Sheldon, Inc., 60 Prospect Street, is architect and engineer.

The Perkins Machine & Gear Co., Brightwood District, Springfield, Mass., is negotiating for the purchase of the plant of the Springfield Body Co., West Springfield. The Perkins company specializes in cut gears and was recently reorganized with officers and directors of the Chapman Valve Co. the controlling interests. Much of its work is done by contract, but in the event of the purchase of the body plant all work will be assembled there. A. W. Gilbert is the new president and general manager and John J. Duggan treasurer.

The Bridgeport Metal Goods Co., Cherry Street, Bridgeport, Conn., has awarded a general contract to the Hewlett Co., 886 Main Street, for a two-story addition, 60 x 240 ft., to cost more than \$50,000 with equipment. Fletcher-Thompson, Inc., 542 Fairfield Avenue, is architect and engineer.

The F. S. Payne Co., 75 Richdale Street, Cambridge, Mass., manufacturer of electric power and hydraulic elevators, has concluded negotiations for the foundry and pattern shop buildings, with three acres of land, at Franklin, Mass., formerly occupied by the Golding Press Division of the American Type Founders Co., and will use for expansion. A portion of present equipment; it is understood, will be removed to the new location and additional machinery provided.

The controlling interest in the Florence Stove Co., Gardner, Mass., manufacturer of oil stoves, heretofore held by Joseph P. Carney, has been purchased by Jackson & Curtis and Spencer Trask & Co., 50 Congress Street, Boston, investment securities, who propose to expand the business. H. D. Carter will continue as president.

Power equipment, conveying and other machinery will be installed in the addition, 45 x 200 ft., to be erected to the plant of the National Biscuit Co., 129 Franklin Street, Cambridge, Mass., to cost in excess of \$100,000. Headquarters are at 85 Ninth Avenue, New York. Plans have been filed.

The Suburban Gas & Electric Co., Beach Street, Revere, Mass., has plans for a one-story shop, 55 x 100 ft., for repair and other service, to cost \$50,000.

The Superior Cabinet Works, Inc., 93 Newell Avenue, Pawtucket, R. I., has acquired property on Waverly Place and plans the early erection of a new one-story factory, to total about 25,000 sq. ft. of floor space, and to cost upward of \$60,000 with equipment.

O. B. North & Co., New Haven, Conn., have been incorporated with a capital of \$250,000, and will continue the manufacture of saddlery hardware and malleable iron castings.

South Atlantic States

BALTIMORE, May 23.

PLANS have been completed by the American Oil Co., American Building, Baltimore, for a new storage and distributing plant, to cost about \$45,000 with equipment. A one-story service, repair and garage building will be constructed for company motor trucks and cars.

The Board of Trustees, Maryland Training School for Boys, Loch Raven, Md., has plans under way for a new central power plant and mechanical laundry at the institution, to cost about \$100,000 with equipment. Henry P. Hopkins and Allen Burton, 347 North Charles Street, Baltimore, are associated architects.

The Electric Public Utilities Co., Baltimore, care of Clarence W. Miles, Baltimore, attorney, recently formed under Delaware laws, has applied for permission to take over and consolidate the Home Electric Co., Lonaconing, Md.; the Emmitsburg Electric Co., Emmitsburg, Md.; Annetam Electric Light & Power Co., and Midland Electric Co., operating in Washington and Allegany Counties, and to issue bonds for \$4,000,000, a portion of the fund to be used for the merger, extensions in power plants and transmission lines.

The Board of Awards, office of the City Register, City Hall, Baltimore, is asking bids until June 1 for equipment, tools and supplies for the Board of Education for automobile shops, general shops, sheet metal shops, and mechanical drawing department in the local schools.

The Columbia Aircraft Corporation, Charles A. Levine, president, 233 Broadway, New York, is said to be contemplating the construction of a new plant on the air junction field at Richmond, Va., for the manufacture of Wright-Bellanca type monoplanes, including parts and assembling departments. The entire project is reported to cost in excess of \$90,000.

The Oliver C. Putney Granite Co., Alburtis, Md., is planning the installation of additional equipment, including cutting and polishing machinery, etc.

The Hampton Roads Motors, Inc., 418 Dickson Building, Norfolk, Va., recently organized under State laws with a capital of \$500,000, is planning the establishment of a plant

at Hampton Roads, Va., for the manufacture of air-cooled motors and parts. The initial works will cost in excess of \$100,000 with equipment.

W. W. Smith, care of the Savannah Industrial Development Corporation, Savannah, Ga., is at the head of a project to construct a local mill for hardwood production, consisting of band mills, planing mill, machine shop, boiler house, etc., on a 25-acre tract. The plant will have a rated output of 1,000,000 ft. per month and is reported to cost more than \$150,000 with equipment. Harvey Granger, president of the Development corporation, is interested in the project.

The Union Shipbuilding Co., Baltimore, has inquiries out for a gate-type shear for heavy duty, capable of cutting ship scrap up to 3 in. thick and 5½ ft. wide.

The Savannah River Electric Co., Greenwood, S. C., is completing plans for the construction of a hydroelectric generating station on the Savannah River, near Clark's Hill, S. C., with power dam about 3800 ft. long and 90 ft. high, to develop a total capacity of 120,000 hp. The power plant will be equipped with four 30,000 hp. units, and transmission lines will be built to Charleston, S. C., Macon, Ga., and vicinity. The entire project is scheduled for completion in about 30 months, and will cost in excess of \$15,000,000. The company is affiliated with the Georgia Railway & Power Co., Atlanta.

The Town Council, Star, N. C., is asking quotations on three motor-driven pumping units, deep-well type, with automatic switches, controls, etc., for the municipal waterworks.

The City Council, Summerville, S. C., has approved plans for the installation of pumping machinery and 100,000-gal. capacity steel tank on 100-ft. tower, for a proposed municipal water system, for which bonds for \$130,000 have been voted. The Ryan Engineering Co., 1216 Washington Street, Columbia, S. C., is engineer.

The Columbia Avenue Auto Parts Co., 314 West Biddle Street, Baltimore, has awarded a general contract to the C. J. Spielman Co., Westport, Md., for a new one-story plant, 35 x 120 ft., to cost about \$35,000 with equipment.

The Denmark Machine & Foundry Co., Denmark, S. C., has inquiries out for semi-Diesel or Diesel horizontal type, crude oil engines, 40, 50, 60 and 74-hp. ratings.

The Richmond Storage & Service Garage, Inc., Richmond, Va., care of J. Luther Moon, Electric Building, recently formed with a capital of \$600,000, has plans for a new six-story automobile service, repair and garage building, 130 x 165 ft., with foundations to provide for two additional stories later, to cost in excess of \$175,000 with equipment. Lee, Smith & Van Dervoort, Builders' Exchange Building, are architects.

S. Wade Callahan, Woodward Building, Washington, architect, is planning the purchase of a 10-kw. electric lighting plant for installation at the Charlotte Hall School, Charlotte Hall, Md.

Milwaukee

MILWAUKEE, May 23.

IMPROVED inquiry, especially from some of the larger automobile factories, which for several months have displayed little buying activity, is giving encouragement to the machine tool trade. Inquiry covers both tool room and production equipment, although in no instance is large lot business in prospect. Replacement needs still dominate purchases, but the number of customers is increasing and the sources broadening. Used tools are moving moderately.

The Racine Radiator Co., Eighteenth and Flett Streets, Racine, Wis., will transfer its plant and offices to Milwaukee to improve deliveries to automobile factories through better transportation facilities by lake and rail. A tract of 5½ acres at Oklahoma Avenue and the Milwaukee road tracks has been acquired from the Filer & Stowell Co., and the contract has been let to Klug & Smith, engineers, 34 Mack Block, Milwaukee, for a brick and steel factory, 125 x 475 ft., part two stories for offices, 30 x 150 ft. Some additional equipment will be acquired to supplement the present layout at Racine. The new works are to be ready Sept. 1.

The Tobin Tool & Die Co., 160 South Brook Street, Fond du Lac, Wis., has awarded contracts for the construction of a one-story shop addition, 40 x 80 ft., and is in the market for miscellaneous equipment.

The Madison, Wis., Auto Parts & Machine Co. has been incorporated with a capital stock of \$10,000, to deal in new and used automotive parts and to conduct a general machine and repair shop. The principals are Henry W. Meyer, 1105 East Gorham Street; F. A. Stephan and Nat P. Blart.

The LeRoi Co., 660 Sixtieth Avenue, West Allis, Milwaukee, which is erecting several shop additions, has purchased

a foundry crane from the Modern Pouring Device Co., Port Washington, Wis. Four cranes remain to be purchased. O. P. Willms is plant engineer.

Work will start as soon as insurance adjustments are completed on the construction of a new foundry, 75 x 150 ft., costing about \$50,000, by the Moloch Foundry & Machine Co., Kaukauna, Wis., which recently sustained a heavy fire loss. The company manufactures power hammers, automatic stokers, etc. R. M. Kanik is general manager.

The Kimberly-Clark Co., main offices, Neenah, Wis., manufacturer of paper, fiber, etc., will build a hydroelectric generating plant to cost upward of \$4,000,000 at Smoky Falls, Ont., the seat of one of its Canadian mills. Plans have been completed by George F. Hardy, consulting engineer, New York, and the construction contract has been placed with Morrow & Beatty, Peterborough, Ont. Frank J. Sensenbrenner is president and general manager.

The Kohler Co., Kohler, Wis., is erecting two new enameling shops, Nos. 8 and 9, 195 x 200 ft., and a new finishing building, 115 x 200 ft., for its bathroom equipment and fixture plant.

The Wisconsin Iron & Metal Co., 129 Washington Street, Oshkosh, Wis., is having plans prepared for a new plant and refinery, 60 x 120 ft., and a warehouse and scrap handling plant, 100 x 150 ft., on the site of its original plant, destroyed by fire several weeks ago. Morris Block is president and manager.

The Common Council, Kenosha, Wis., expects to ask bids soon for the construction and equipment of a sewage disposal plant estimated to cost \$225,000, and also has plans for enlargement of and changes in the intercepting sewer system estimated to cost \$304,000. Plans are by Alvord, Burdick & Howson, 8 South Dearborn Street, Chicago. R. M. Smith is city engineer.

The Duo-Lok Mfg. Co., Stevens Point, Wis., is a new corporation which is engaging in the manufacture of automatic locking devices and mechanical devices for opening and closing factory and garage doors. The capital stock is \$35,000. Stephen H. Maronek is president and general manager.

The Board of Public Works, Fond du Lac, Wis., will ask bids after June 15 for the construction and equipment of a new sewage disposal and pumping plant costing upward of \$200,000, according to estimates by Alvord, Burdick & Howson, consulting engineers, Chicago. Specifications include 1800 lin. ft. of 24-in. cast iron force mains. George H. Stanchfield is city engineer.

Buffalo

BUFFALO, May 23.

BIDS will soon be asked by the Metal Arts Co., Inc., 77 South Avenue, Rochester, N. Y., for a new one-story plant to cost close to \$45,000 with equipment. B. Frank Kelley, Terminal Building, is architect.

The United States Light & Heat Corporation, Niagara Falls, N. Y., manufacturer of storage batteries, lighting equipment, etc., recently merged into a new company to be known as the USL Battery Corporation, has plans for a one-story addition to its plant at Oakland, Cal., to cost in excess of \$25,000 with equipment.

The Power Corporation of New York, Watertown, affiliated with the Northern New York Utilities, Inc., same address, will convert its four hydraulic power plants on the Raquette River for hydroelectric generating service, installing equipment for an increase of more than 20,000 hp. The company has arranged for a bond issue of \$5,000,000, a portion of the fund to be used for this and other expansion. J. N. Carlisle is president.

The Board of Education, Niagara Falls, N. Y., is said to be arranging an early call for bids for its proposed three-story vocational school, to cost \$400,000 with equipment. Kirkpatrick & Cannon, 503 Third Street, are architects; Walter McCulloh, Gluck Building, is consulting engineer.

The Whalen-Noxon Lamp Corporation, Syracuse, N. Y., care of Edward F. Noxon, 115 Erie Street, recently formed by Mr. Noxon and associates, is planning the operation of a local plant for the manufacture of automobile headlights, signal lighting equipment and kindred apparatus. Archie G. Palmer, 600 James Street, is also interested in the company.

The Doehler Die Casting Co., Batavia, N. Y., is disposing of a preferred stock issue to total \$1,000,000, a portion of the fund to be used for expansion, including increase in production of metal products apart from die castings.

The Board of Education, Forestville, N. Y., is considering the installation of manual training equipment in a proposed three-story high and grade school to cost \$165,000, for which bids have been asked on a general contract. Frank A. Spangenberg and Earl Martin, 250 Delaware Avenue, Buffalo, are associated architects.

The Monroe County Commissioners of Public Buildings,

Rochester, N. Y., have plans for a one-story addition to the steam power house on the Henrietta Road, with installation of additional equipment. S. Firestone, 59 South Avenue, is engineer.

The Lenox Furnace Co., Syracuse, N. Y., has ordered a 72-in. x 9-in. x 8-in. Allen portable pneumatic riveter from the John F. Allen Co., 370 Gerard Avenue, New York.

Pittsburgh

PITTSBURGH, May 25.

PLACING of orders for several items by the Westinghouse Electric & Mfg. Co. on its quarterly list has served to enliven an otherwise dull market in machine tools. Inquiry is in small volume.

The Iron City Electric Co., Baum Boulevard and Melwood Street, Pittsburgh, electric equipment and supplies, batteries, etc., has acquired a one and three-story building, 75 x 100 ft., for a new service and repair plant and will remove to the new location.

The Board of Education, Wilkesburg, Pa., plans the installation of manual training equipment in a new three-story high school, estimated to cost \$600,000, for which bids will soon be asked on general contract. Thomas M. Scott & Son, 230 Fifth Avenue, Pittsburgh, are architects.

The R. D. Nuttall Co., Harrison Avenue and McCandless Street, Pittsburgh, manufacturer of gears, pinions and other transmission equipment, has plans for an addition, to cost about \$200,000 with equipment.

The Erie Lighting Co., 21 West Tenth Street, Erie, Pa., has completed plans for a two-story service, repair and garage building for company motor trucks and cars, to cost close to \$75,000 with equipment.

The Crystal Block Mining Co., Sprigg, W. Va., is considering rebuilding the tippie at its Gates mine, recently destroyed by fire.

The Carbon & Carbide Chemical Corporation, Charleston, W. Va., is planning the construction of a pumping plant on the Kanawha River at its South Charleston works.

The Marshall Estate foundry properties, Railroad and Twenty-eighth Streets, Pittsburgh, will be offered at a public sale on June 1 by the Fidelity Title & Trust Co., 343 Fourth Avenue.

The New Kanawha Power Co., Glen Ferris, Pa., recently organized by Edward S. Whitney and associates, and said to be a subsidiary of the Carbon & Carbide Chemical Corporation, Charleston, W. Va., has applied for permission to construct and operate a hydroelectric generating plant on the Kanawha River, between Montgomery and Charleston, with initial capacity of 30,000 hp. A transmission line will be built. The entire project will cost in excess of \$700,000.

The Chesapeake & Ohio Railway Co., Richmond, Va., has plans for enlargements in its locomotive repair shops at Huntington, W. Va., including additional buildings and equipment. Facilities will be provided for repair work and reconditioning of large type engines, heretofore handled at the plant of the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., and at the American Locomotive Co. works at Richmond.

The Witherow Steel Corporation has been organized under Pennsylvania laws to take over the plant and business of the Witherow Steel Co., Neville Island, Pittsburgh, and to carry out an expansion program for a new type of die-rolled front axle for automobiles, and other products. The new company has arranged for a bond issue of \$750,000 for this and other purposes. W. P. Witherow, heretofore president of the Witherow Steel Co., will occupy a like position for the new corporation.

St. Louis

ST. LOUIS, May 23.

BIDS will soon be asked by the Peake Auto Supply Co., 310 East Sixteenth Street, Kansas City, Mo., for a three-story addition to its service and repair department, to cost \$75,000 with equipment. C. A. Peake, Jr., is president.

The International Shoe Co., 1505 Washington Avenue, St. Louis, is having plans drawn for a two-story power house at its plant at Hartford, Ill., 36 x 54 ft., to cost \$35,000. H. Reinhardt, 1820 Cherokee Street, St. Louis, is architect.

The National Zinc Co., Bartlesville, Okla., is arranging an expansion and improvement program to cost close to \$1,000,000. The work will include the remodeling of the smelting plant and the installation of machinery, a new acid plant and other structures.

The Central States Power & Light Corporation, Kahl Building, Davenport, Iowa, is completing plans for a new power house at Allen, Okla., 50 x 90 ft., to cost close to \$20,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in the proposed two and three-story plant to be built at St. Louis, by the C. J. Patterson Corporation, 4050 Penn Avenue, Kansas City, Mo., to cost \$115,000. Vorse, Kreatsch & Kreatsch, Commonwealth Building, Des Moines, Iowa, are architects.

The Wells Motor Co., 3008 North Grand Boulevard, St. Louis, is having plans drawn for a one and two-story and basement service, repair and garage building, 100 x 150 ft., to cost more than \$100,000 with equipment. G. H. Hargitt, 5332 Vernon Avenue, is architect.

The Atchison, Topeka & Santa Fe Railway Co., Topeka, Kan., is asking bids on a general contract until May 31 for extensions and improvements in its shops and yards at Emporia, Kan., including engine house with capacity of 40 locomotives and repair facilities, one-story wood-working and planing mill, two-story mechanical school for apprentices, ice house and other buildings, to cost in excess of \$150,000. E. A. Harrison, 80 East Jackson Boulevard, Chicago, is company architect.

The All-Locking Shingle Mfg. Co., Owensville, Mo., E. Englebrecht, president, is reported to be planning the construction of a one-story factory at Jefferson City, Mo., to cost in excess of \$25,000 with equipment.

The Cutter Machine Co., Maplewood, Mo., has plans for a one-story machine shop, 27 x 97 ft., at 3723 Commonwealth Avenue.

The Empire Refineries, Inc., Bartlesville, Okla., has work under way on extensions in its oil refinery at Ponca City, Okla., to include the installation of two new units and auxiliaries. Expansion will be carried out also at the refining plants at Cushing and Gainesville, Okla., with installation of additional machinery.

The Hotel Kitchen Equipment Co., 915 Market Street, St. Louis, has awarded a general contract to the Cunliff Construction Co., 410 North Euclid Avenue, for a three-story and basement plant to cost approximately \$60,000.

Cincinnati

CINCINNATI, May 23.

A SLIGHT improvement in machine tool sales is noted, but the market continues spotty from the standpoint of both orders and production. An automobile manufacturer in the Detroit district has bought 12 lathes and other equipment from local builders. Aside from this transaction, however, bookings from the automotive industry have been light. There have been a few purchases made by railroads, but, on the whole, carriers have bought only a small quantity of tools in the past month. Business has come principally from widely scattered sources in the general industrial field. Operation of local machine tool plants is being maintained on a moderate scale. The Taylor-Wilson Mfg. Co., McKees Rocks, Pa., has contracted for a 6-ft. right-line radial drill.

Contract has been let by the Cincinnati Street Railway Co., Dixie Terminal Building, Cincinnati, to the Fisher DeVore Co., same address, for a one-story car repair and reconditioning shop to cost in excess of \$350,000 with equipment.

The Armstrong Mfg. Co., Springfield, Ohio, manufacturer of mechanical stokers, etc., has authorized plans for rebuilding the portion of its plant recently destroyed by fire. It is estimated to cost more than \$30,000. The property is owned by the I. W. Rogers Estate and occupied by the company under lease.

The Kentucky Power Co., Augusta, Ky., has plans under way for extensions and improvements in its steam-operated power plant at Maysville, Ky., with installation of additional equipment.

The Nashville Railway & Light Co., Watkins Building, Nashville, Tenn., will erect an addition to its generating plant on the Cumberland River to cost about \$130,000 with equipment. J. P. W. Brown is vice-president in charge.

The L. J. Breed Equipment Co., James Building, Chattanooga, Tenn., has inquiries out for a motor-driven air compressor, capacity from 1200 to 1800 cu. ft. per min.

Hurry-Up Broadway, Inc., F. W. Curran, president, 329 East Broadway, Louisville, is said to have preliminary plans for a new multi-story automobile service, repair and garage building, 85 x 155 ft., to cost about \$160,000 with equipment.

The General Power & Light Co., Calhoun, Ky., is considering the early rebuilding of the portion of its electric light and water plant destroyed by fire May 10, with loss reported at \$16,500 including equipment.

The James A. Brownfield & Sons Co., Covington, Ky., will rebuild the portion of its planing mill and wood-working

plant, recently destroyed by fire, with loss reported at close to \$50,000 with equipment. Henry K. Brownfield is president.

The Philadelphia & Cleveland Coal Co., Cincinnati, is considering the construction of a wharf and steel tipple, with auxiliary equipment, to cost close to \$400,000 with machinery. A. H. Morrill is head.

The Knoxville Gas Co., Knoxville, Tenn., plans the purchase of an open feed water heater and other equipment for installation in the boiler department at its local gas plant. An expansion program is under way.

The Chevrolet Motor Co., Memphis, Tenn., is said to be planning the construction of a new two-story factory branch and distributing plant, to cost approximately \$125,000 with equipment.

The Manganese Ore Co., Inc., Watauga Valley, Tenn., has been organized to develop manganese ore deposits in Carter County, Tenn. The company is in the market for used 3-in. black pipe and two centrifugal pumps with 4-in. suction and 3-in. discharge to pump against a head of approximately 350 ft. During the next six months three washers and probably screening and concentrating equipment will be needed.

Detroit

DETROIT, May 23.

CONTRACT has been let by the Pere Marquette Railroad Co., Detroit, without competition, to the Owen, Ames, Kimball Co., Grand Rapids, Mich., for an addition to its engine house and repair shops at the Grand Rapids yards to cost \$35,000.

Following the completion of a metal and press shop, 300 x 350 ft., mill building, 255 x 560 ft., and power house, forming the first unit of the new plant of the Fisher Body Division of the General Motors Corporation, Flint, Mich., the company is planning to proceed with the second unit of the body manufacturing plant. It will consist of a main mill building and several other structures to cost in excess of \$500,000, to be given over to the production of closed bodies for the Buick Motor Car Co., an affiliated organization. When completed, the plant will have a capacity of 1500 closed bodies daily.

The Studebaker Co., South Bend, Ind., is arranging to concentrate operations at its local plant and is scheduling the removal of several divisions from Detroit, including production facilities for the big six-cylinder Commander models. It is purposed to develop entire manufacture of these cars at South Bend, discontinuing the present Detroit works devoted to this line.

The Anaconda Copper Mining Co., 25 Broadway, New York, is reported to be negotiating for the purchase of the plants and businesses of the Detroit Copper & Brass Rolling Mills, 174 South Clark Street, and the Michigan Copper & Brass Co., 5851 West Jefferson Street, Detroit, with intention to consolidate the two organizations and operate in conjunction with its present finished brass and copper goods division.

William P. Schuster, Jackson, Mich., and associates have concluded arrangements for the purchase of the True Mfg. Co., Eaton Rapids, Mich., manufacturer of steel dump bodies for motor trucks. The new owner will take immediate possession and plans expansion in output. Matthew Schuster will be in charge of operations.

B. W. Habel, 34 Mill Street, Pontiac, Mich., has plans for a new two and one-half story automobile service, repair and garage building to cost close to \$100,000 with equipment. Plans were prepared by E. B. Cargyle, engineering department, General Motors Corporation, Detroit.

The Marvel Carburetor Co., Flint, Mich., is being organized under Illinois laws to take over and expand the company of the same name, with local plant. The new company will dispose of a capital stock issue to total \$2,318,960, a portion of the proceeds to be used for general financing and expansion. J. R. Francis is president.

The Hudson Motor Car Co., 12601 East Jefferson Street, Detroit, is arranging for extensions in plant facilities to provide for a production of 3000 complete cars per day. The current output is on a basis of about 1700 cars daily.

Dodge Brothers, Inc., Joseph Campau Avenue, Detroit, is planning for early increase in production for its new six-cylinder cars, now on a basis of 100 per day. It is purposed to develop a schedule of 300 cars per day in this division.

The Crystal Co., Inc., 3733 Beaufait Avenue, Detroit, has been organized to manufacture electrical washing machines. It is in the market for sheet copper, nickel plated and polished cold-rolled steel bars and rods, brass and aluminum castings, channel iron, screws, bolts and nuts.

The General Mfg. Co., Detroit, manufacturer of flexible power presses for straightening, bending and assembling operations, has appointed the Triplex Machine Tool Co., 50 Church Street, New York, as its representative in New Eng-

land, New York, New Jersey and eastern Pennsylvania. The Richey Whaley Machinery Co., 23 East South Street, Indianapolis, has been made representative in that territory.

The Ford Motor Co., has ordered 44 hydraulic presses for use in the manufacture of synthetic hot mold compounds from the H. J. Grigoleit Division of the Reynolds Spring Co., Jackson, Mich. The presses are like those used by the Reynolds company in the manufacture of switch plates and other electrical products of Bakelite and "Reynolite."

Cleveland

CLEVELAND, May 23.

INQUIRIES for machine tools have improved with some dealers, but the volume of sales continues light. Business is almost wholly in single tools from widely diversified industries. The May volume is expected to show little change as compared with April. A fair amount of wood-working machinery is in prospect, but purchasers are slow in placing orders.

The Cleveland Board of Education will take bids May 31 for about a dozen metal and wood-working tools and some small equipment for the Thomas A. Edison School. The list follows:

- Two 14-in. lathes.
- Two 10-in. drill presses.
- One 20-in. vertical drilling machine.
- One 2-wheel grinder.
- One 14-in. grinder.
- One 30-in. band saw.
- One 24-in. single cylinder surfer.
- One 15-in. disk sander.
- Two 4-ft. wood turning lathes.

The Weber Brass Co., Cleveland, will erect a new plant at East Twelfth Street and Emerald Court.

The Locke Machine Co., Cleveland, will move June 1 into a new plant at 971 East Sixty-third Street, owned by the Lake Erie Iron Co. The Locke company manufactures automatic and screw machine products. E. H. Baker, Jr., is vice-president and general manager, and J. E. Toner, sales manager.

The Union Metal Mfg. Co., Canton, Ohio, manufacturer of lighting standards, is erecting a one-story addition, 90 x 340 ft., and a one and two-story addition, 90 x 160 ft.

Plans are being drawn by the Hickok Electric Instrument Co., 10514 Dupont Avenue, Cleveland, for a two-story addition, 30 x 45 ft., to cost close to \$50,000 with equipment. The H. M. Morse Co., Finance Building, is architect and engineer.

The Bingham Stamping & Tool Co., 1062 Post Street, Toledo, Ohio, has plans under way for a new two-story addition to cost approximately \$45,000. Bollinger & Hayes, Ontario Street, are architects. Jeremiah Bingham is president.

The Board of Education, Garfield Heights, Ohio, is said to be planning the installation of manual training equipment in a proposed high school on the Turney Road to cost \$450,000, for which bids are being asked on a general contract until June 6. Fulton & Taylor, 8120 Euclid Avenue, Cleveland, are architects.

The Bailey Meter Co., 2015 East Forty-sixth Street, Cleveland, manufacturer of electrical-measuring instruments, has asked bids for improvements and alterations in a one and two-story factory on the Ivanhoe Road to cost \$50,000.

The Grasselli Chemical Co., Guardian Building, Cleveland, manufacturer of industrial chemicals, mineral products, etc., has awarded a general contract to the H. K. Ferguson Co. for an addition to its plant at Lockland, Ohio, to cost about \$75,000.

The Toledo Edison Co., Toledo, Ohio, is completing plans for expansion at its Acme electric generating plant in the east side district, to cost upward of \$1,250,000 with equipment.

Indiana

INDIANAPOLIS, May 23.

CONTRACT has been let by the Fries Tool & Machine Works, Fort Wayne, Ind., to Henry Wehrenberg & Sons, Farmers' Trust Building, Indianapolis, for a one-story machine shop to cost \$25,000 with equipment. Guy Mahurin, Standard Building, Fort Wayne, is architect.

The Eel River Power Co., Indianapolis, care of the Mead-Balch Construction Co., Indianapolis, has applied for permission to construct a hydroelectric generating plant on the Eel River, vicinity of Eagle Mills, Putnam County, Ind., to cost approximately \$3,000,000 with transmission system. The company has also asked authority for a bond issue of \$4,000,000, the fund to be used in part for the project. The

company is headed by T. R. Mead and John W. Balch of the Mead-Balch Construction Co., and Arthur J. Lays, Ridgeville, Ind.

The Western Oil Refining Co., 310 North Meridian Street, Indianapolis, has awarded a general contract to C. W. Morrow, 1126 East Main Street, for a new oil storage and distributing plant at Muncie, Ind., with machine shop and service building, to cost approximately \$40,000. The main unit will be one story, 30 x 102 ft.

The Rimes-Lee Garage, Indiana Harbor, Ind., has plans for a new service, repair and garage building to cost close to \$100,000 with equipment.

The Board of School Trustees, Fort Wayne, Ind., plans the installation of manual training equipment in a proposed addition to the Oxford school to cost \$150,000, for which bids will soon be asked on a general contract. Pohlmeier & Pohlmeier, Central Building, are architects.

The City Council, Evansville, Ind., has authorized a bond issue of \$1,200,000 for the installation of a new filtering plant for the municipal waterworks, to replace a structure recently destroyed by fire. W. W. Southgate is city engineer.

The Cleveland, Cincinnati, Chicago & St. Louis Railway Co. will build a machine shop, 50 x 104-ft.; a power house, 40 x 100 ft., and a 16-stall engine house at Anderson, Ind.

Gulf States

BIRMINGHAM, May 23.

THE Wichita Falls Cotton Oil Co., Wichita Falls, Tex., has had plans drawn for a one-story addition, 60 x 230 ft., to cost more than \$50,000 with equipment. Walker & Dixon, Wichita Falls, are architects.

The American Brick Co. has been organized with a capital of \$60,000 by S. J. Gaddy, 810 Adeline Street, Hattiesburg, Miss., and associates, to take over the plant and property of the Riverside Brick & Mfg. Co., Riverside, totalling about 80 acres. Plans are under way for enlargements and for the production of other heavy clay products. H. M. Crawford, Hattiesburg, is also interested in the new organization.

S. N. Hughes, Brady Building, San Antonio, Tex., is at the head of a project to construct an ice-manufacturing and cold storage plant at McAllen, Tex., to cost approximately \$65,000 with equipment. R. E. Horn, McAllen, is also interested.

The Newell Contracting Co., Inc., Martin Building, Birmingham, has purchased a tract of about 13 acres and contemplates the erection of a new equipment and distributing plant. A cement-mixing plant, asphalt-heating works, and other departments will be installed. The entire project will cost in excess of \$175,000. A. F. Newell is president.

The Syndicate Power Co., Dallas, Tex., operated by the Middle West Utilities Co., 72 West Adams Street, Chicago, has applied for permission to construct and operate a hydroelectric generating plant on the Colorado River, near Kingsland, Tex., to develop a capacity of 40,000 hp., with transmission system. The project is reported to cost in excess of \$1,000,000.

The Chicago, Rock Island & Pacific Railroad, 803 South La Salle Street, Chicago, has awarded a general contract to Joseph E. Nelson & Sons, 3240 South Michigan Avenue, for an addition to its engine house and shops at Amarillo, Tex., to cost about \$60,000. A. W. Hawk is company engineer of buildings.

The Hub Reynolds Motor Car Co., 220 Montgomery Street, Montgomery, Ala., has arranged for the erection of a new two-story service, repair and garage building, 96 x 150 ft., to cost about \$90,000 with equipment. Okel & Cooper, Bell Building, are architects.

The secretary, DeRidder Chamber of Commerce, DeRidder, La., is interested in the establishment of a local cottonseed oil mill, and is inquiring for detailed information regarding machinery, prices, etc.

The Western Paper Makers' Chemical Co., Kalamazoo, Mich., has purchased a tract of 10 acres and taken options on 15 acres additional at Marrero, New Orleans, as a site for a new branch plant to cost close to \$250,000.

The Common Council, Brookhaven, Miss., is asking bids until June 7 for pumping equipment for the municipal waterworks. R. S. Purser is waterworks engineer. Perry A. Coker is town clerk.

The Lone Star Gas Corporation, Dallas, Tex., operating natural gas properties, pipe lines, compressor stations, etc., has arranged for a bond issue of \$15,000,000, a portion of the fund to be used for extensions and betterments, including the installation of additional equipment.

J. C. Campbell, San Antonio, Tex., is at the head of a project to construct and operate an ice-manufacturing and cold storage plant at Vinton, La., to cost about \$45,000 with equipment.

The Pecos Valley Power & Light Co., Austin National Bank Building, Austin, Tex., has arranged for a bond issue of \$1,750,000, a portion of the fund to be used for the construction of its proposed steam-operated electric generating plant near Girvin, Tex.; oil will be used as fuel. The initial station will have a capacity of 12,000 kw. A transmission line will be built for service at the oil properties of the Gulf Production Co. and the Marland Oil Co. in the Crane-Upton County fields, and to the plant of the Big Lake Oil Co., Big Lake. All of these oil companies are arranging for the early electrification of their plants. The Pecos Valley company will be operated under the direction of Ford, Bacon & Davis, Inc., 115 Broadway, New York, engineer; G. I. Rhodes, of the last noted organization, is president of the power company.

The Warren County Highway Commission, Bonelli Building, Vicksburg, Miss., is asking bids until June 8 for one convertible power shovel, with buckets, dragline, hoist, auxiliary equipment and rigging to convert into a working shovel. George M. Sudduth is secretary.

Toronto

TORONTO, May 23.

OF special interest to machine tool dealers and builders in this territory is the announcement that the Canadian Pacific Railway is in the market and will place orders soon for a number of tools for its Eastern and Western shops. The Canadian National Railways are also making purchases, but mostly for replacement. Some good business has been closed from the automotive industry, and Canadian interests are looking for a good sized list from the General Motors Corporation of Canada for the addition under way at its Oshawa, Ont., works. Orders of a diversified character are appearing in good volume from practically all sections of the Dominion.

The Dominion Engineering Co., Montreal, has received orders from the Quinze Power Co. for hydraulic machinery in connection with 26,000-hp. unit installation at Quinze Falls, Que., for delivery next spring.

The Utilities Commission, Simcoe, Ont., plans the installation of additional transformers in a local power plant and other work estimated to cost \$20,000.

It is stated that the General Motors Corporation of Canada, Oshawa, Ont., plans to spend approximately \$1,000,000 in addition to the expenditure recently announced. A new stamping plant will be constructed.

The Massey-Harris Co. is having plans prepared for an addition to the plant of the Verity Plow Co., Brantford, Ont.

The Wabash and Canadian National Railways propose to establish joint shops at Tecumseh, Ont., to cost upward of \$1,000,000. Construction work will start early in June.

Work will start about June 1 on the construction of a 200-ton paper mill on the site of the Great Lakes Paper Co., Ltd., Fort William, Ont. Other units will be built later.

Negotiations have been completed whereby the Stephens-Adamson Mfg. Co., Aurora, Ill., will take over the plant of the Marsh Engineering Works, Belleville, Ont. The purchasing company will continue the manufacture of its own lines as well as those of the Marsh Engineering Works.

The Shawinigan Water & Power Co., Montreal, which recently purchased property in the vicinity of Gros Pin, a few miles from Quebec, contemplates the erection of a smelter to refine minerals obtained in Gaspé, Châteauguay and Eastern townships.

Western Canada

The Riverside Iron Works, Calgary, Alta., has started work on an addition to its plant at 803 Twenty-fourth Avenue, to cost \$20,000. It is the intention to build a second addition later, making the total expenditure on improvements \$60,000.

An addition, 100 x 200 ft., to the blacksmith shop and other improvements are under way at the Western shops of the Canadian Pacific Railway Co., Winnipeg, and the present shop will be given over to the manufacture of frogs. Locomotive parts will also be made.

Pacific Coast

SAN FRANCISCO, May 18.

THE Magnavox Co., 2725 East Fourteenth Street, Oakland, Cal., manufacturer of radio equipment, has begun excavations for a new one-story plant at Emeryville, Cal., 100 x 120 ft., to cost close to \$100,000 with machinery. Other units will be erected later. B. J. Cahill, 357 Twelfth Street, Oakland, is architect.

The Board of Education, Fresno, Cal., in planning the installation of a vocational training department in the proposed Alexander Hamilton junior high school, to cost about \$225,000 with equipment, for which plans will be drawn by Felchin, Shaw & Franklin, Pacific Southwest Building, architects.

The New Metal Products Co., Emeryville, Cal., will rebuild the portion of its plant recently destroyed by fire, estimated to cost \$25,000.

The City Council, Antioch, Cal., is planning the installation of electrically operated pumping machinery in connection with a proposed new waterworks. A fund of \$100,000 is being arranged for the entire project. Ralph Naas is city engineer.

The Woolwine Metal Products Co., 2421 East Eighth Street, Los Angeles, is having plans drawn by the Austin Co. of California, 777 East Washington Street, for a group of one-story buildings totaling about 75,000 sq. ft. of floor space, estimated to cost close to \$175,000 with equipment. It is expected to begin work in June.

The Coolidge Propeller Co., 66 West Marion Street, Seattle, manufacturer of airplane propellers, etc., is considering plans for a one-story machine shop, 35 x 100 ft.

Emilio Giometti, Fresno, Cal., and associates have awarded a building contract to the Cyclops Iron Works, 837 Folsom Street, San Francisco, for a one-story ice-manufacturing plant with an initial capacity of 20 tons per day. It is proposed to construct a second unit of like size in the fall. The entire project will cost in excess of \$85,000 with machinery.

The General Petroleum Corporation, Higgins Building, Los Angeles, will soon begin the construction of its new oil refinery near Redondo, Cal., to cost close to \$10,000,000. The company purposes to concentrate operations at the new location, and the refinery will replace the present plant at Vernon, near Los Angeles.

The Zellerbach Paper Co., 534 Battery Street, San Francisco, has broken ground for a new four-story storage and distributing plant, to cost about \$260,000, with elevating, conveying and other equipment. Building contract recently was let to Barrett & Hilp, 918 Harrison Street. Ellison & Russell, Pacific Building, are engineers. The company will also erect a similar one-story plant, 50 x 150 ft., at Portland, Ore., to cost in excess of \$80,000.

The Tucson Gas & Electric Co., Tucson, Ariz., will erect an addition to its plant to cost about \$50,000 with equipment.

The Board of Education, Logan, Utah, has plans under way for a new mechanic arts building at the North Cache high school, 70 x 120 ft., to cost close to \$40,000 with equipment. Fred W. Hodgson, Logan, is architect.

The Los Angeles Pressed Steel Co., 525 Petroleum Securities Building, Los Angeles, has been organized to reduce light sheet scrap hydraulically welded to form by a new process and also to manufacture a high grade ball for ore and cement mills. The company expects to erect a steel frame building. The Vickers Mfg. Co., Los Angeles, is acting as its agent in the purchase of a 1000-ton hydraulic press and a 300-ton press. Other equipment such as furnaces and conveyors will be purchased.

Foreign

BERNARD BANDLER & SONS, 8 West Fortieth Street, New York, producers of mineral carbons, or black diamonds, used for the face of diamond drills and other cutting service, have secured a concession on deposits in the Piranhas district, State of Bahia, Brazil, and plans the installation of machinery for the development of its mineral resources for commercial production.

Albert Pauks, representing the Ungarische Stahlwarenfabrik A. G., Budapest, Hungary, maker of motorcycles, has come to the United States to arrange for sources of supply of various parts to be used in assembly of motorcycles and 6 to 16-hp. motor cars. He can probably be reached through the Poldi Steel Corporation of America, 151 Bank Street, New York.

A public utility company in Japan, recently formed by the merger of two electric power interests, is planning the construction of a hydroelectric generating plant at Nozawamachi, Fukushima Prefecture, with transmission system. It is expected to require from 36 to 48 months for completion. Information at the office of the Bureau of Foreign and Domestic Commerce, reference Japan No. 51176; also at the American Consulate, Tokyo, Japan, J. H. Ehlers, trade commissioner.

The Metals Coating Co. of America, 497 Third Street, Philadelphia, is completing arrangements for the early operation of a branch plant at Prague, Czechoslovakia. Richard L. Binder is president.